When you cannot get what you might have wanted : consequences of a restriction of choice

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Abstract: People often find it difficult to make decisions and are likely to defer their choices in the absence of an obvious best solution. Choice deferral potentially brings an alteration of the availability of the options in the choice set. Whereas a considerable amount of research has been directed at added options, little attention has been paid to the case of lost options. In this thesis I investigate (a) the cognitive processes that follow the exclusion of an option from a set of options and (b) how these processes affect the evaluation of the remaining options and the choice among them. Building on research on asymmetric comparisons, the first central assumption of a newly developed theoretical model claims that the excluded option serves as a standard for the evaluation of the remaining options. In order to be selected as a standard of comparison in the evaluations of the remaining options, the excluded option should increase in cognitive accessibility due to the exclusion. The second central assumption is that the consequences of the exclusion depend on the valence of the salient features of the excluded option: For salient negative features, the model predicts a general increase of attractiveness of the remaining options and a preference for the option most dissimilar to the excluded option. For salient positive (?) features of the excluded option, however, the model predicts a general decrease of attractiveness of the remaining options and a preference for the most similar option. A series of experiments was conducted to test the central assumptions of our theoretical model. The increased cognitive accessibility hypothesis was tested in two studies employing an incidental memory task after the exclusion of an option from a choice set. Results indicate that the features of the excluded option are more likely to be recall and therefore more accessible than features of the remaining options. The salient feature hypothesis regarding the predicted effects of the exclusion on the evaluation of the remaining options was supported in a third study showing that the change in attractiveness of the remaining options depends on whether the positive or the negative features are especially salient. In addition, the choice between the remaining options was affected by the exclusion in the predicted way. The discussion integrates the presented theoretical account and empirical findings into the context of other research areas such as too-much choice and the selection of goals. Finally, practical implications of this research are discussed. Diese Dissertation untersucht die Konsequenzen des Verlusts einer Option bei Entscheidungen. Die zentrale Forschungsfrage dabei lautet: Wie beeinflusst der Ausschluss einer Option die Wahrnehmung der verbleibenden Optionen und die letztendliche Entscheidung für eine dieser verbleibenden Optionen? Diese Frage wird im Rahmen der vorliegenden Arbeit ausgehend von einer kognitiven Perspektive und einem Fokus auf die informationsverarbeitenden Prozesse, die durch den Ausschluss angestossen werden, untersucht. Dazu wird im ersten Teil der Arbeit ein theoretisches Modell entwickelt, das Prinzipien der kognitiven Psychologie und der Urteilsforschung integriert. Die zentrale Idee dieses Modells besagt, dass die ausgeschlossene Option als Vergleichsstandard zur Bewertung der verbleibenden Optionen herangezogen wird. Im zweiten und dritten Teil der Arbeit werden diese Annahmen im Rahmen von vier experimentellen Studien untersucht. Die drei zentralen Annahmen und ihre empirische Überprüfung wird im folgenden erläutert: Anname 1: Der Ausschluss führt dazu, dass die ausgeschlossene Option eine, gegenüber den anderen Optionen erhöhte, kognitive Zugänglichkeit aufweist. Diese Annahme wird insbesondere im zweiten Teil der Arbeit unter Verweis auf grundlegende kognitive Prinzipien begründet. Unter Verwendung eines Incidental-Memory Paradigmas, in dem die Versuchspersonen nach dem Ausschluss einer ursprünglich zur Verfügung stehenden Alternative gebeten wurden, sich an möglichst viele Merkmale aller Optionen zu erinnern, zeigte

sich in zwei experimentellen Studien mit unterschiedlichem Stimulusmaterial hypothesenkonform, dass die Merkmale der ausgeschlossenen Optionen mit einer höheren Wahrscheinlichkeit erinnert werden als die der verbleibenden Optionen. Annahme 2: Die erhöhte kognitive Zugänglichkeit führt dazu, dass die ausgeschlossene Option als Standard in Vergleichprozessen fungiert, die den Bewertungen der verbleibenden Optionen zugrunde liegt. Die Bewertung der verbleibenden Optionen unterscheidet sich vor und nach dem Ausschluss in Abhängigkeit davon, ob bei der ausgeschlossenen Option insbesondere negative oder positive Merkmale salient sind: Bei salienten negativen Merkmalen sollten die verbleibenden Optionen nach dem Ausschluss positiver als zuvor wahrgenommen werden, bei salienten positiven Merkmalen hingegen negativer. Diese Effekte wurden in einer Studie, in der die Valenz der salienten Merkmale manipuliert wurde, zumindest teilweise belegt. Entsprechend der Vorhersage unterschied sich die Veränderung der Bewertungen in Abhängigkeit von der Valenz der salienten Merkmale. Allerdings zeigte sich neben dem vorhergesagten Zugewinn an Attraktivität für saliente negative Merkmale auch bei salienten positiven Merkmalen ein minimaler Zugewinn. Mögliche Gründe für diese Abweichung liegen in dem spezifischen Stimulusmaterial. Annahme 3: In den Vergleichsprozessen bestimmen die salienten Merkmale des Vergleichsstandards, welche Merkmale der verbleibenden Optionen für die Bewertung besonders relevant sind. Gleichzeitig liefern die salienten Merkmale des Vergleichsstandards einen Referenzpunkt zur relativen Bewertung der korrespondierenden Merkmale der verbleibenden Optionen. In einer Studie mit speziell gestaltetem Stimulusmaterial, in dem stets eine Merkmalsdimension pro Option hervorgehoben wurde, führte der Ausschluss einer Option tatsächlich zu einer systematischen Verschiebung der Präferenz für eine der verbleibenden Optionen. In der abschliessenden Diskussion wird das theoretische Modell im Hinblick auf die gefundenen Ergebnisse bewertet. Mögliche zukünftige Forschungsansätze zur weiteren Untersuchung der Modellannahmen werden hierbei aufgezeigt. Daneben wird das Modell im Kontext anderer Forschungsgebiete wie z.B. “Hyper choice“ und die Auswahl von Zielen diskutiert und auf praktische Implikationen der zentralen untersuchten Fragestellung eingegangen.

When You Cannot Get What You Might Have Wanted:

Consequences of a Restriction of Choice

Thesis

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ABSTRACT

People often find it difficult to make decisions and are likely to defer their choices in the absence of an obvious best solution. Choice deferral potentially brings an alteration of the availability of the options in the choice set. Whereas a considerable amount of research has been directed at added options, little attention has been paid to the case of lost options.

In this thesis I investigate (a) the cognitive processes that follow the exclusion of an option from a set of options and (b) how these processes affect the evaluation of the remaining options and the choice among them. Building on research on asymmetric comparisons, the first central assumption of a newly developed theoretical model claims that the excluded option serves as a standard for the evaluation of the remaining options. In order to be selected as a standard of comparison in the evaluations of the remaining options, the excluded option should increase in cognitive accessibility due to the exclusion. The second central assumption is that the consequences of the exclusion depend on the valence of the salient features of the excluded option: For salient *negative* features, the model predicts a general increase of attractiveness of the remaining options and a preference for the option most dissimilar to the excluded option. For salient *positive* (?) features of the excluded option, however, the model predicts a general decrease of attractiveness of the remaining options and a preference for the most similar option.

A series of experiments was conducted to test the central assumptions of our theoretical model. The increased cognitive accessibility hypothesis was tested in two studies employing an incidental memory task after the exclusion of an option from a choice set. Results indicate that the features of the excluded option are more likely to be recall and therefore more accessible than features of the remaining options. The salient feature hypothesis regarding the predicted effects of the exclusion on the evaluation of the remaining options was supported in a third study showing that the change in attractiveness of the

remaining options depends on whether the positive or the negative features are especially salient. In addition, the choice between the remaining options was affected by the exclusion in the predicted way. The discussion integrates the presented theoretical account and empirical findings into the context of other research areas such as too-much choice and the selection of goals. Finally, practical implications of this research are discussed.

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Introduction

Choice is a central part of human life. The life path of an individual can be narrated as a line of smaller and bigger decisions he or she takes, opportunities he or she selects, and alternatives he or she fails to pursue. As of early childhood, however, we learn that we cannot always have what we want. Our choices are often limited and we have to learn to choose within given constraints. The interplay between constraints and self-determination is a delicate equilibrium that varies along an individual's life span (e.g., Freund, Nikitin, & Ritter, 2009), but also between cultures and societies (e.g., Hui & Villareal, 1989; Oishi, Diener, Lucas, & Suh, 1999).

Traditionally, psychological research has focused on the benefits of personal choice (Deci, 1975; Deci & Ryan, 2000; Zuckerman, Porac, Lathin, & Deci, 1978). More recently, however, attention has also been directed at the costs and downsides of choice (e.g., Botti & Iyengar, 2006; Schwartz, 2000). In particular, an abundance of alternatives has been shown to entail negative consequences for the person who has to make the decision (Sheena S. Iyengar & Lepper, 2000; Sheena S. Iyengar & Lepper, 2002; Schwartz, 2004; Schwartz & Ward, 2004; Schwartz et al., 2002).

This thesis focuses on a very specific question in the context of choice and its limitations, namely, on the consequences of restricting choice. How do we react if we lose an option that was previously available? What if, while we are still pondering about which meal to choose in a restaurant, the waiter tells us that one of the options is not available today? What if we learn that one of the movies we are considering going to see is sold out before we have made up our mind to go or not? Or, while we are still trying up to make our mind, which subject we want to study, we hear that for one the subjects the application deadline has already passed? How does this affect our perception of the remaining options and our decision-making?

In order to find an answer to these questions, I will adopt an informational perspective (Mussweiler, 2003a) in this thesis in order to investigate the cognitive consequences of restricting choice. In the following section, I will provide a brief introduction to this perspective and discuss the central constructs of this thesis.

General Theoretical Perspective and Assumptions

This thesis adopts a constructivist and contextual view of judgment and decision-making. In short, this means that our evaluations and choices are not based on an internal master list that we consult when facing a decision. Rather, we use the information that is accessible to us in the decision situation and construct a judgment. In the following, I will outline several basic assumptions that characterize this position.

People are neither completely rational nor do they process all the information available when making a decision. Rather, people are selective with information due to their limited processing capacities and they adapt to the specific situation and the demands of the context (e.g., Gigerenzer & Selten, 2001; Gigerenzer & Todd, 1999; Todd & Gigerenzer, 2003).

In a decision situation, people form mental representations of the options they have. Those mental representations are based on whatever information comes to mind at the moment of their construal. The likelihood with which something comes to mind is generally referred to as cognitive accessibility (Higgins, 1996). In any given situation, it is the specific situation as well as the personal goals and other personal variables (e.g., beliefs, motives, emotions) that determine which information comes to mind (cf., Schwarz, 2009). The knowledge base, that is, the total information on the options available to the person – from memory and perceptual input – is generally much more abundant than the formed representations and therefore only selective information is included in the representations.

The selection and integration of information serves to provide the basis for a sound judgment in a specific situation. In other words, the information is selected in accordance

with the goals of the decision-maker. For example, people draw on different information depending on whether their goal is to select one of two options or to reject one of two options (Shafir, Simonson, & Tversky, 1993). They also draw on different information depending on whether the options are located in the near or distant future (Liberman & Trope, 2003).

However, not only meaningful but also haphazard conditions can influence the selective integration of information. Priming experiments have demonstrated how judgments are suggestible to temporal-preceding, unrelated input (e.g., Srull & Wyer, 1979). Different forms of presentation of the same information have also been shown to influence or even reverse judgments (framing effect, e.g., P. Slovic, 1995; P. Slovic & Lichtenstein, 1983; Tversky & Kahneman, 1981).[1] Moreover, research on the anchoring paradigm has produced numerous examples of how contextual cues influence judgment, even when people know that the contextual information is produced by chance or should be discarded (Gretchen B. Chapman & Johnson, 2002; Jacowitz & Kahneman, 1995; Kahneman, 1992; Strack & Mussweiler, 1997; Wilson, Houston, Etling, & Brekke, 1996). Consider the example of a judge who is deliberating about the suitable sentence for a criminal (cf., Englich, Mussweiler, & Strack, 2006). If this judge receives a call from a journalist asking whether the sentence will be more or less than three years, the information of three years should not affect the formation of the judgment. Unfortunately, however, it does (Englich et al., 2006).

In summary, judgments and decisions are conceived as constructive processes that are responsive to a person's goals and to the social and physical context. Selecting information is a flexible and sensitive process that is normally functionally related to the given situation but, due to its flexibility, is also open to irrelevant or even unwanted influences.

The elements of the representation of options are referred to as features. According to Tversky (1977, p. 329), features "may correspond to components such as eyes or mouth; they

[1] Note, however, that the framing of a decision can interact with the motivational orientation of the decision maker. Different frames can elicit diverging goals, in respect to which the reversed judgment is again meaningful.

may represent concrete properties such as size or color; and they may reflect abstract attributes such as quality or complexity." Options might share common features (e.g., weight), in which case the feature refers to the specific value of this attribute (e.g., 100 kg or "very heavy"). They might also apply only to specific options. In the process of decision-making, the features of the option are matched and compared (Tversky, 1972). Again, not necessarily all the features are involved in this process – sometimes people base their decision only on one feature (cf., Gigerenzer & Goldstein, 1999). In addition, not all features are normally given the same importance in the decision-making process. Particular features might be accentuated because of their relation to the goals of the person in the decision situation. They might also be accentuated on account of the conditions of the specific decision situation, as described above.

In the following, I will briefly outline how this perspective is applied to the case of a restriction of choice within the scope of this thesis. The three central parts of this thesis comprise the development of a theoretical model (Part I) and the empirical testing of its main assumptions (Parts II and III).

Part I: Asymmetric Comparison in Choice Processes

Part I of this thesis starts off by taking a broader look at comparisons in choice situations. The aim of this first part is to apply a core finding in similarity research on for choices between multiple options. Similarity research has established the notion that comparison processes between two objects are directional. That is, it makes a difference whether A is compared to B or B to A, with A and B being two objects whose similarity is to be judged. This notion contrasts with former conceptions of similarity in mostly geometrical terms that placed the two objects in some coordinate space (cf., Tversky, 1977). The directionality of comparisons implicates that the two objects being compared have diverging roles. The one role is often labeled "target" and the other one "standard" or "referent".

Reversing the assignment of the objects of comparison to the two roles leads to differences in the resulting judgment.

Part I reviews several influential models that address these differences and explore the role of target and standard in comparisons. Next to the seminal *contrast model* of Tversky (1977), Ortony's (1979) *referent model*, and the *structural alignment* approach (Gentner & Markman, 1997) are discussed and elaborated with respect to their commonalities and differences. The aim of this literature review is to establish a clear conception of the roles of target and standard. We then address the question of how these roles affect comparisons in choices. Some researchers applied the idea of asymmetric comparison to choices between two options (e.g., Houston, Sherman, & Baker, 1989). In Part I, we extend this application to choices between multiple options and formulate a hypothesis about general conditions under which asymmetric comparisons play a role in such decisions.

As a paradigmatic case for such conditions, we discuss the exclusion of one option from a set of options. We develop a process model – hereinafter referred to as an *Accentuation Model* – that spells out the cognitive consequences of restricting choice in this way. Underpinning this model is the idea that the exclusion of an option increases the cognitive accessibility of this option, which in turn makes it the preferred standard of comparison for the remaining options. The role of the standard is then to accentuate features within the remaining options. From this model we derive predictions for two different kinds of judgments people might form when choosing between several options. People make an absolute judgment about the attractiveness of each of the options and they form a preference judgment in which they evaluate the relative attractiveness of each option compared to the other options in order to make a choice.

The subsequent parts of this thesis will then aim to provide empirical evidence for the central assumption of the model (Part II) and its predictions concerning evaluations and choices (Part III).

Part II: Keeping in mind what you cannot have: Cognitive perseverance of lost options

Part II of this thesis addresses the first assumption of this model, namely the increase in accessibility of an option after this option has been excluded from a choice set. This assumption is placed in a broader context of the influence of allegedly irrelevant past events on decisions. In a rational perspective on decisions, lost options are irrelevant for the decision when they are unrelated to the outcome of the decision. On many occasions, however, people display a suggestibility to past events in their decisions and judgments. We propose a cognitive rationale as to why this might be the case – at least for the instance of the excluded option.

Part II builds an argument based on general cognitive principles as to why excluding an option should yield an increase in the accessibility of that option. We then present two experiments that test this prediction. In the first experiment, participants are presented with a hypothetical choice between three cars, whereas in the second experiment, participants have an actual choice between three cups, one of which they would actually receive as a gift. In both experiments an incidental memory task is employed to test the accessibility of the features of the options.

Part III: Consequences of a restriction of choice: Shifting evaluations and choices

Part III of this thesis looks at the predictions derived from the Accentuation Model with regard to the evaluation of the remaining options and the choice among the remaining options. The Accentuation Model developed in Part I makes specific predictions about the consequences of restricting choice. The restriction is assumed to affect the general level of attractiveness of the choice alternatives, that is, the absolute judgments about each alternative. The restriction is also assumed to affect the choice of one of the alternatives, that is, the relative or preferential judgment. Part III examines two experiments that focus on these two different judgments.

In the first experiment, participants have a choice between several word puzzles, one of which they are to select with a view to solving. Before making their choice, they are asked to evaluate each of the options individually. After these initial evaluations, one of the options is randomly excluded. Participants are then asked to evaluate the two remaining options again. In the second experiment, a student sample is asked to choose between three different courses. Again, one course is excluded before participants make their choice. In this study, it is interesting to note how the exclusion affects the participants' choices of the remaining options.

General discussion

The results of Parts II and III are summarized in the general discussion. The empirical evidence is evaluated with regard to the theoretical assumptions from Part I. Moreover, the Accentuation Model is situated in the context of other related research areas, which throws up an array of further-reaching questions and future research ideas.

Part I:

Asymmetric comparison in choice processes

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Abstract

Since Tversky's (1977) seminal paper on asymmetric comparisons was published, comparisons of different options are generally believed to be directional. Interestingly, the asymmetry involved in comparisons has not been considered systematically for choices between different options. This paper argues that, in decision situations, one of the options serves as a dominant standard against which the others are evaluated, which results in asymmetric comparisons and, in turn, has important and systematic consequences for the choice process. This paper outlines which conditions should result in asymmetric comparisons. Taking existing models of asymmetric comparisons into account, a process model will be presented using the loss of a previously available choice option as an example.

Key words: Asymmetric comparison, decision making, restriction of choice

Introduction

Imagine that you want to buy a new CD player. You walk into an electronics store, find the CD player section, and compare the different models with respect to technical features and design. You compare them all until you find the one that best fits your needs. Now imagine a different situation in which a certain CD player is on display at the electronics store with all the advantages of this model highlighted in the display. After taking a close look at the promotional display, you compare the promoted model to alternative models. Would the comparisons you made in the second situation be equivalent to those made in the first situation? Would your choice be the same? In this paper, we argue that the comparison processes in the two situations would be structurally different and, more precisely, that comparisons made in the second situation would be based on information acquired from the display about the promoted model.

Based on the assumption that comparison processes and decision processes share many similarities (Dhar, Nowlis, & Sherman, 1999; Medin, Goldstone, & Markman, 1995), we have adopted a theoretical perspective stemming from research on comparison processes or, more specifically, on asymmetric comparisons, to analyze the situation described above. We argue that the different options in a choice set are not weighted equally in certain situations. Instead, one of the options serves as a standard of comparison for evaluating the other options. The central consequence of this asymmetry is a differential salience of specific aspects (e.g., attributes or dimensions) of the options, which in turn affects the importance of this information for the decision process. After providing some background information about the relevance ofcomparison processes for decision-making, we will review extant models of asymmetric comparisons and then elaborate on the boundary conditions under which asymmetric comparisons are likely to play a role in choices between options. Using the example of the situation in which a previously available option is excluded from the decision

process, we will show how asymmetric comparisons might affect the valence of the remaining options.

Evaluation, comparison, and choice

There is an ongoing debate in literature on social judgments and decision making about whether attitude (e.g., Eagly & Chaiken, 2007; Schwarz, 2007) and preferences (e.g., Lichtenstein & Slovic, 2006; Simonson, 2008) are stable and inherent to the person or constructive and dependent on the given situation. Conclusive empirical evidence that evaluations and preferences are context-sensitive would contradict the idea of a fixed internal master list of preferences that people have stored in their memory and consult whenever they make decisions (for an overview, see Bettman, Luce, & Payne, 1998; Lichtenstein & Slovic, 2006). Aspects of the decision situation and the choice options affect judgment to a large extent. Among such determinants are those that belong to the "inner context" of the person making the judgment (e.g., his or her goals or mood) as well as characteristics of the evaluation situation (e.g., number of options, sequence and form of option presentation, response format).

A classic example of the susceptibility of judgments to situational parameters is the anchoring effect (Jacowitz & Kahneman, 1995; Wilson et al., 1996). Anchoring values can be any values that people pick from the context of the judgment and use as reference points for their judgment. The anchoring effect was nicely demonstrated in a study by Englich, Mussweiler, and Strack (2006). Legal professionals were asked to provide a sentencing decision for a hypothetical criminal case based on realistic case material comprised of information typically provided in actual court cases. The manipulation consisted of an imaginary phone conversation in which a journalist asked the judges whether they thought the sentence would be higher or lower than one year (low-anchor group) or three years (high-anchor group). The anchor had a significant influence: Participants in the high-anchor group

gave considerably higher sentences than those in the low-anchor group. Anchoring effects can even occur when the anchor is not processed consciously (Mussweiler & Englich, 2005).

Simple priming can also influence judgments. In a recent study, Critcher and Gilovic (2008) asked participants to judge the likelihood of failure for a particular player in a football match. The stimulus materials included the player's professional record and a photo of him during a match. The materials for the two experimental groups differed only in the player's jersey number in the photo (54 for one group, 94 for the other). Judgments showed a clear influence of this arbitrary contextual information, the group presented with the higher jersey number judging the likelihood of failure to be greater. Thus, priming with a higher number, even when entirely irrelevant to the judgment at hand, seems to raise estimates of likelihood.

This research demonstrates that people base their judgments on contextual information, even if it is entirely irrelevant to the judgment at hand. Furthermore, this research also exemplifies the relativity of judgments and evaluations. In evaluating a target or forming a judgment, we do so with reference to a relevant – or even irrelevant – standard. We use a mental grid specifying the relevant dimension(s) and a reference point to position an item. This process appears to be so basic that contextual information enters the process even in situations in which people possess a well-established cognitive script for making judgments (as in the example with the legal professionals). Judgments and evaluations, then, always involve a comparison of existing or construed alternatives (Kahneman & Miller, 1986; Mussweiler, 2003b). The comparison has a considerable impact on the resulting judgment.

What constitutes a choice situation? For one, there must be at least two options. The set of options, one could argue, provides the most immediate and highly relevant and salient context for the evaluation of each option. One of these options is likely to serve as a standard of comparison against which the other options are compared (Tversky, 1972). To exemplify the consequences of the presence of a comparison standard more generally, let us first consider two examples of situations in which standards are made explicit.

Nobel laureate Herbert Simon (1955) introduced the idea that, due to various internal (e.g. cognitive capacities) and external (e.g. temporal resources) constraints, people are not able to consider all possible options and their probable consequences in order to make optimal decisions. Instead, they "satisfice," stopping their search for a solution when they find one that is satisfactory. They evaluate the available options with respect to a pre-established satisfaction level and end the information-gathering process when an option meets (or exceeds) that level. However, the aspired level of satisfaction is also malleable: If a solution that exceeds the aspired level of satisfaction is found very easily, the aspiration level might be increased; conversely, if it proves difficult to find a solution, the aspiration level might be decreased.

Tversky's (1972) elimination-by-aspects model is also an example of explicit standards used in decision making. This model assumes that options from a finite set of options are sequentially eliminated. In each round of the comparison process, one feature is selected as being necessary and options that do not possess that feature are eliminated.

In both examples, the available options are considered *with respect to* a given standard and aspects of the options that do not form part of the standard are ignored. Thus, the explicit standards in these examples fulfill a twofold role. First, they signal which aspects of the options are to be considered. Second, they provide a point of reference against which the aspects of the options are evaluated. In this paper, we stress these functional properties of standards and argue that they pervade any context in which standards are involved.

In decision making, however, standards are not necessarily explicit. As research by Houston and colleagues (Houston, Sherman, & Baker, 1991) shows, standards can also be constructed on the basis of information about *all* of the given options. That is, an ideal standard can be assembled from positive features of all the options (or, an anti-ideal standard from negative features of all the options). As we will discuss in more detail below, one option can also serve as a standard against which the others are compared.

Similarity and choice

Similarity judgments and choices are strongly intertwined. For a preference judgment, people have to establish a rank order of available options. That is difficult to do when options are very similar (Medin et al., 1995) or very dissimilar (Gentner & Markman, 1994). Similarity judgments, however, do not only affect the way people rank preferences. In their review on parallel phenomena in similarity and decision processes, Medin and colleagues (1995) provided convincing evidence that similarity judgments and decision making share basic cognitive processes. The assumption that these two types of processes bear similarities bolsters adoption of the strategy to apply theories, models, and empirical findings established in one domain to the other and should ultimately lead to an integration of the fields in research and theorizing. We now turn to an intriguing field within similarity research, namely, asymmetric comparison. We will review central theoretical and empirical work on asymmetric comparison, discuss the application of asymmetric comparison to choice situations, and propose a more extensive application of this theoretical perspective.

Asymmetric comparisons

In comparing two objects, it is generally assumed that people represent the objects as assemblies of features and the relations between those features (Tversky, 1977). For instance, a CD player might be represented by sound quality, price, and technical configuration. Note that comparisons typically do not entail a representation of all features of the different objects as this would, in most cases, result in a matrix too complex to handle cognitively. In any comparison, only a subset of features enters the comparison matrix. Moreover, features that are relevant to the comparison are more likely to enter into the comparison matrix. The relevance of a feature, in turn, depends largely on the goal of the judgment. For instance, comparing two people with respect to how well they are suited for a clerical position will yield a very different representation than when the goal is to determine which is older. However, as we will explain later, the relevance of a feature and thereby its impact on the

comparison is also affected by rather arbitrary characteristics of the comparison situation such as the order of presentation and the prominence of the objects involved. The result of a comparison process, then, not only depends on the features of the objects, but also on whether those features are used for the comparison and if they are perceived as relevant to the judgment at hand. The very process of comparing different options, then, might lead to different perceptions of the relevant comparison dimensions depending upon the options in the comparison set. Moreover, the same features of a given object might be evaluated differently depending on the available comparison objects. In fact, one of the central issues in comparison research is to explain the choice of comparison dimensions and the evaluation of features of the objects in the comparison set. As will be shown below, changing the order of the objects of comparison can illuminate the issue of the relevant comparison dimensions.

In his influential paper, Tversky (1977) pointed out that the directionality of a comparison affects judgments. In a classic study on directionality, one group of participants was asked to compare North Korea to Red China and the other group to compare Red China to North Korea. The similarity of North Korea and Red China was found to be higher in the first condition than in the second (Mussweiler, 2001a; Tversky, 1977). In the first condition, the position of North Korea represented the target (often also called "subject") of comparison and Red China the standard (also often called the "base" or "referent"). The perceived similarity is therefore higher with Red China as the standard and North Korea as the target than vice versa. The effect of the directionality of a comparison is also manifest in the preference for a certain order of making comparisons. In general, people prefer to compare the less prominent item to the more prominent item or, in other words, to compare the variant to the prototype (Bowdle & Gentner, 1997; Tversky, 1977). Thus, target and standard play different roles in the comparison process. Although there is much agreement in the literature on this point, theories differ with respect to their assumptions on the *specific* roles of target

and standard. In the following section, we will review some prominent theoretical accounts of this question.

Contrast Model

According to Tversky's (1977) contrast model, similarity judgments are based on three different feature sets that result from a process aimed at establishing a match between features of two comparison objects, A and B: unique features of A, features shared by A and B, and unique features of B. Unique features are conceived of as decreasing similarity, shared features as enhancing similarity. According to Tversky's focusing hypothesis, in similarity judgments, features of the target will be given more weight than features of the standard. The distinctive or unique features of the target – features that are not matched by the standard – reduce perceived similarity more than the unique features of the standard do. According to the contrast model, similarity is primarily determined by the size of the set of unique features of the target as compared to the size of the set of features shared by both objects.

The size of the set of unique features is assumed to depend on the *prominence* of an object. The more prominent an object, the greater the number of features that are accessible for comparison. Thus, more prominent objects have a larger set of unique features than less prominent objects do. Similarity will therefore be lower when the prominent object serves as the target and higher when the less prominent serves as the target of comparison. Although the unique features of the standard are not ignored, they are assumed to play a minor role in similarity judgments. Thus, asymmetries result from the differential weighting of the distinctive features of the target and those of the standard.

Referent Model

Ortony's (1979) referent model extended and modified Tversky's contrast model. He proposed that the crucial element in asymmetric comparisons is the relative salience of the matching features in the two comparison objects. Directional asymmetries arise because people prefer the matched feature to be more salient in the standard than in the target. This

means that people tend to use as a standard of comparison the object that has the more extreme value or that is more typical with respect to a given feature (e.g., honey would probably be preferred as the standard in comparisons of orange marmalade and honey with respect to sweetness). Therefore, asymmetries in directional comparisons might also result from differences in the set of common features (see alsoAguilar & Medin, 1999). The prominent object is presumably also more structured (Bowdle & Gentner, 1997; Gentner & Bowdle, 1994)(Bowdle & Gentner, 1997; Gentner & Bowdle, 1994), which makes it a good standard for generating relevant comparison dimensions. In this perspective, the size of the common feature set depends on the prominence of the standard: The more information available about the standard, the more matches possible in the feature-matching process. From Ortony's perspective, directional comparisons yield asymmetries because the generated comparison-relevant knowledge primarily depends on the standard.

This account differs in three relevant ways from the contrast model: First, Tversky's (1977) focusing hypothesis posits that people naturally focus on the target. From Ortony's perspective, the standard serves as the primary source of information for the comparison process. Second, in the contrast model, asymmetries result from differences in the set of option-unique features. In Ortony's referent model, asymmetries stem from different sets of common features. Third, the referent model assumes that different directions in the comparison process also lead to different feature sets. In contrast, Tversky's contrast model posits that both comparison directions yield the same comparison information; thus, the three feature sets (unique to A, shared by A and B, unique to B) are invariant to direction. What differs as a function of the comparison direction in this model is the relative *salience* of the unique feature sets.

Structural Alignment

The role of the standard is also highlighted in structural alignment model (Gentner & Markman, 1997). This account stresses the process of alignment, in other words, how the

correspondence between the objects of comparison are established. Gentner's (1983, 1989) structure-mapping theory originally focused on analogy. Analogy and similarity, however, are seen as equivalent with respect to the information processing involved (Bowdle & Gentner, 1997; Gentner & Markman, 1997). This account goes beyond the feature perspective in that it considers the relations between the features as well as the structure that forms these relations (i.e., the hierarchy of mental representations). For instance, in comparing two pictures, it is not only the presence of identical elements (e.g., a tree and an apple) that contribute to similarity, but also whether the elements are related to each other in the same way (e.g., the apple falling from the tree vs. the apple thrown at the tree). The comparison process is assumed to proceed by aligning and mapping these structures.

The central factor determining what information is considered for the comparison is systematicity. Systematicity is defined as the presence of higher-order connections between lower-order relations (Bowdle & Gentner, 1997; Gentner & Markman, 1997). The systematicity imbalance hypothesis states that people prefer to map from the more coherent and systematic item onto the less systematic item because the comparison process aims at establishing the maximally consistent match. When the direction of comparison is experimentally assigned, the informativity exhibited by the comparison directions varies. People draw more information from a comparison when the standard is the more systematic object. After matching the structures, the standard provides candidate inferences for potential features of the target. That is, due to congruent structures, features of the standard are inferred to be equally present in the target. Thus, information is projected from the standard to the target. Similarity here is not only a function of objects' features, but also of the concordance of their role within the relational structure of the objects.

Comparison asymmetries in this approach are explained by the directional informativity hypothesis: Different comparison directions yield different numbers of candidate inferences on the basis of structural completion (Markman & Gentner, 1993). To

illustrate, let us return to the example of the comparison between North Korea and China. Here, a candidate inference could be that since China is a Communist state with restricted freedom of speech and since North Korea is also a Communist state, that North Korea has equally restricted freedom of speech. Thus, asymmetries typically arise due to differences in the systematicity of the objects being compared (Bowdle & Gentner, 1997; Gentner & Bowdle, 1994). Comparisons with the more systematic object as the standard maximizes the amount of information projected from the standard to the target. Some empirical evidence in support of Bowdle and Gentner's (1997) hypothesis exists. Participants in their study read vignettes with various degrees of causal coherence. They then consistently preferred comparisons in which the more coherent passage was the standard and the less coherent passage the target. They also made more inferences from the more coherent passage to the less coherent one. Finally, they rated comparisons to more coherent standards as being more informative than the reverse comparisons. According to this perspective, the standard carries the main weight in establishing which of the features enter the comparison process because it is posited to provide the informational basis. In other words, people use information about the standard to detect and generate information about the target. When people are free to choose the direction of comparison, they use the object that is higher in systematicity and coherence as the standard.

What can be concluded from this review of the three dominant models of asymmetric comparisons? The asymmetries in comparisons demonstrate that judgments strongly depend on what information is processed during the comparison process. More specifically, they show that judgments differ as a function of the assignment of items to the roles of standard and target. As the properties of these roles and their impact on the comparison process are highly relevant for the purpose of this paper, we will summarize the different views.

We use the term "comparison stage" to refer to the information actually used in the formation of a judgment. Relevant for the comparison stage is which of the two objects is the

primary source of information. The matching process needs some initial information. Tversky's model is mute with regard to how feature matching is established (i.e., the process that results in the sets of unique and shared features). This means that his model does not assume a primary search direction. The contrast model assumes that there is no effect of direction of comparison on the comparison stage. The three sets of features (unique to A, shared by A and B, and unique to B) are seen as invariant to the conditions under which the objects are compared. In contrast, the structural-mapping account (Gentner & Markman, 1994) and Ortony's (1979) perspective make an explicit assumption concerning how direction information is primarily processed in the comparison process. They draw on linguistic bases of comparisons as an argument for their assumption. According to Grice's (1975) communication maxim of informativity, people expect utterances to be informative. An utterance is informative when the given information precedes new information, a rule that is also known as the "given-new contract" (Clark & Haviland, 1977). Therefore, the standard is supposed to provide relevant information about the target. People make use of information they have about the standard to elicit knowledge about the target. This argument is especially plausible for specific forms of comparisons like metaphors, similes (Ortony, Von Druska, Foss, & Jones, 1985), and analogies (Gentner & Markman, 1997). Research by Medin aet al. (1995) also supports the assumption that different information is processed in a comparison process depending on the assignment of the roles of target and standard, and that the activation of knowledge that enters the comparison stage is dominated by the standard.

In self-other comparisons, the self functions as the habitual standard (Srull & Gaelick, 1983; J. B. White, 2008). If the direction of comparison is experimentally assigned, the more elaborated self-knowledge leads to asymmetries in similarity judgments (Hodges, Bruininks, & Ivy, 2002; Karylowski, 1989; Karylowski & Skarzynska, 1992). Due to the self-involvement, such comparisons are highly susceptible to affective and motivational variables like the general valuation of the other person (Hodges, 2005).

Asymmetric Comparison in Choice

Applying the perspective of asymmetric comparison to the realm of choices, Houston, Sherman, and Baker (1989) found direction-of-comparison effects in choices between two objects (cars, vacations, apartments, college courses) due to sequential presentation of the options. They hypothesized that when options are presented one after the other, the focus will generally lie on the second option, making its features salient in the comparison process. They designed options equal in general attractiveness that had either shared positive features (e.g., option A: cheerful, option B: cheerful) and unique negative features (e.g., option A: boastful, option B: lazy) or shared negative features (e.g., option A: boastful, option B: boastful) and unique positive features (e.g., option A: cheerful, option B: considerate). Following the rationale of the cancellation and focus model proposed by these authors, the shared features should be cancelled out in the comparison process because they do not provide discriminative value. The unique features of the second option – the focal option – should determine the preference. Houston et al. (1989) argued that the focal option serves as the starting point for the comparison process. The information available about the focal option is mapped onto the other option, either finding a match or not. Accordingly, in their study, when pairs of unique-positive options were presented, participants were expected to select the second option whereas for unique-negative options they were expected to select the first option. Results confirmed these predictions. Houston, Sherman and Baker (1991) replicated these findings and, in addition, showed that the direction-of-comparison effect was due to sequential presentation. When the different options were presented side by side, neither option was in the focus of comparison. Moreover, in this presentation format, no preference reversals were found between unique-positive and unique-negative pairs (Houston & Sherman, 1995).

The studies of Houston et al. showed that asymmetric comparisons influence the choice between two options. Whenever one option is in the focus of a comparison, the salient features of this option will guide the comparison process (Dhar et al., 1999; Dhar &

Simonson, 1992; Kardes & Sanbonmatsu, 1993). This guiding can be regarded as a highlighting or accentuating of the salient features of the standard, giving them more weight in the preference construction. For example, Dhar et al. (1999) asked participants to make first a directional comparison between two options before giving a preference rating (study 1). Results revealed a clear preference in favor of the focal option when the both options were generally attractive and a preference in favor of the non-focal option when both options were generally unattractive. However, the mechanism that turns one option into the standard of comparison is not limited to sequential presentation. As studies on similarity show, other variables such as differences between options in prominence or structuredness are equally important for determining direction-of-comparison effects and might yield similar consequences. Kardes and Kalyanaram (1992) showed a direction-of-comparison effect for pioneering brands. The first-entry advantage of the pioneering product over later entrants to the market results from the pioneer dominating the comparison stage. The dominance of information stemming from the standard is also demonstrated in a study by Medin, Goldstone, and Gentner (1993), in which participants had to indicate the features on which they based their comparison judgment. Independent raters assessed each feature with respect to whether it was more strongly associated with the target or the standard. Results showed that a majority of features considered for the judgment were linked to the standard. A general hypothesis that can be drawn from these considerations is that, whenever one option possesses a quality that clearly discriminates it from the other options in the set ('comparative distinctiveness'; Higgins, 1996) it will be more easily accessible and hence more likely to serve as the standard of comparison. In such cases, the salient features of the distinct option become accentuated in the comparison process and have a stronger effect on the resulting judgment than features of the other options. The dominance of information stemming from the standard is a core tenet of both the structural alignment approach (Gentner & Markman, 1997) as well as in the referent model (Ortony, 1979).

To our knowledge, the reasoning of asymmetric comparison has not yet been applied to choices between multiple options. We assume that the processes that determine the asymmetry of comparisons and its effects on the judgment process for two-option judgments also apply to judgments involving larger sets of options. Accordingly, in a multiple-option setting that comprises a clearly distinct option, this option is likely to serve as a standard and the knowledge about this option is likely to dominate the comparison stage. Various conditions have the potential to render one option especially distinct from other options, such as certain environments that highlight certain options (e.g., by literally putting one option into the limelight) or the immediate choice context, namely the configuration of the choice set.

Research on the *attraction effect* or the asymmetrical domination effect reveals how an added third option can change the shares of choices between two similar attractive options. In this research paradigm, binary choice sets – a target option and a competitor – are compared with trinary choice sets – a target, a competitor, and a decoy. The options are characterized on two attribute dimensions (e.g. quality and price) with the target being superior on one dimension and the competitor being superior on the other dimension. The location in the attribute space for the added third option is generally selected according to two conditions: First, the attractiveness of the additional option is lower than that of the other two options, so that it is hardly ever chosen. Second, the added option is fully dominated by the target (i.e., the target is superior on both dimensions) but only partly dominated by the competitor.

In an early demonstration, Huber, Payne, and Puto (1982) asked participants to make choices in six different product categories (e.g. cars, restaurants, beers, etc.). In a first session, the choice set consisted of the target and the competitor. In a second session 2 weeks later, a decoy was added. Interestingly, the target was chosen more often after the decoy was added. This effect has proven to be robust in many studies and under various conditions (Ratneshwar, Shocker, & Stewart, 1987; Wedell & Pettibone, 1996). In a more recent study, Park and Kim (2005) showed that people anchor their judgment at the decoy even when the

decoy belongs to a different product domain than the target and the competitor. From the perspective we adopt in this paper, those effects reflect judgment evaluative processes that are anchored at the decoy (c.f., Herne, 1998; Tversky & Kahneman, 1991), i.e. the additional option functions as a standard in such choice settings (Bhargava, Kim, & Srivastava, 2000).

Although this hypothesis is a very general one that should, in principle, apply to all judgment and choice situations where one of the options is more salient than the others, we apply it to the sample case of one specific situation, namely the loss of an option from a set of options. We chose this situation to help us elaborate our hypothesis because it is a quite common phenomenon. People often postpone decisions, especially when choosing involves conflict or selection difficulties (C. J. Anderson, 2003; Dhar, 1997a; Tversky & Shafir, 1992). Postponement can result in one of the options becoming unavailable for various reasons (e.g., a special offer runs out). We propose that the exclusion of one option is a form of distinction thereby positioning it as a preferred standard.

Asymmetric choices: The case of the lost option

The restriction of choice has primarily been considered from a motivational perspective in view of the negative consequences a loss of freedom or autonomy might bring (e.g., Brehm, 1966; Deci & Ryan, 1985; Miron & Brehm, 2006). Although we acknowledge the importance of motivational aspects for understanding how people react to restrictions of their choice alternatives, in this paper we will primarily take a cognitive perspective and apply the research on asymmetric choices to the consequences of the loss of a previously available option.

More specifically, we propose that the exclusion of one of the choice alternatives functions as a marker, which results in the excluded option being very likely to stand out against the remaining options, thus serving as the standard against which the remaining options are evaluated. We propose that this results in a contrast effect influencing the evaluation of the remaining options: Depending on the general valence of the choice situation

(i.e., Is this a choice between generally positively valued alternatives or one in which every alternative seems like a bad choice?), the exclusion will either lead to a decrease (in the first case) or an increase (in the latter case) in the value of the remaining options.

As shown in Figure1, our model comprises three steps: (1) Standard selection: The excluded option is used as a standard for subsequent evaluations of the remaining options. (2) Asymmetric comparison: Due to the relative salience of the excluded option, the subsequent comparisons are asymmetric. (3) Featural focus: In these asymmetric comparisons, the excluded option determines which features of the options are considered.

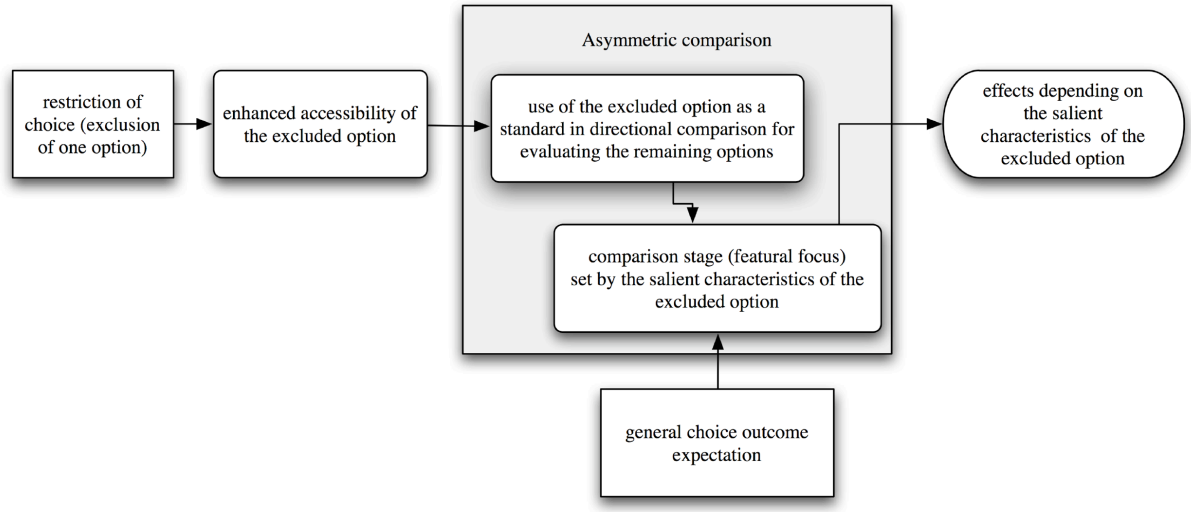

Figure 1. Process model for consequences of choice restriction.

The exclusion of one of the options should make it stand out against the rest of the set because the exclusion is a distinctive feature. As argued by Gentner and Bowdle (1994) and Ortony (1979), the comparison process should then be biased towards the features of the excluded option. Hence, the features of the excluded option should determine which features are considered in the comparison process and provide a reference point.

The exclusion, however, does not determine which features of the excluded option are particularly salient and used for the evaluation of the remaining ones. We posit that the salience of the features in a given choice situation depends on how generally attractive (e.g., choice between equally tasty entrees) or unattractive (e.g., choice between equally unpleasant

household chores) the options in the choice set are. A choice between attractive alternatives should be associated with a positive outcome expectation (e.g., regardless of which of the entrees I choose, I will enjoy the meal) and a choice between unattractive alternatives with a negative outcome expectation (e.g., I will hate doing the chore, regardless of whether it is vacuuming or doing the dishes). In turn, the general expectation should guide one's attention to positive or negative features of the choice options, respectively (Trope & Liberman, 1996). So, the positive features of the excluded option should be more salient when one has positive outcome expectations. In contrast, the negative features of the excluded option should be more salient when one has negative outcome expectations.

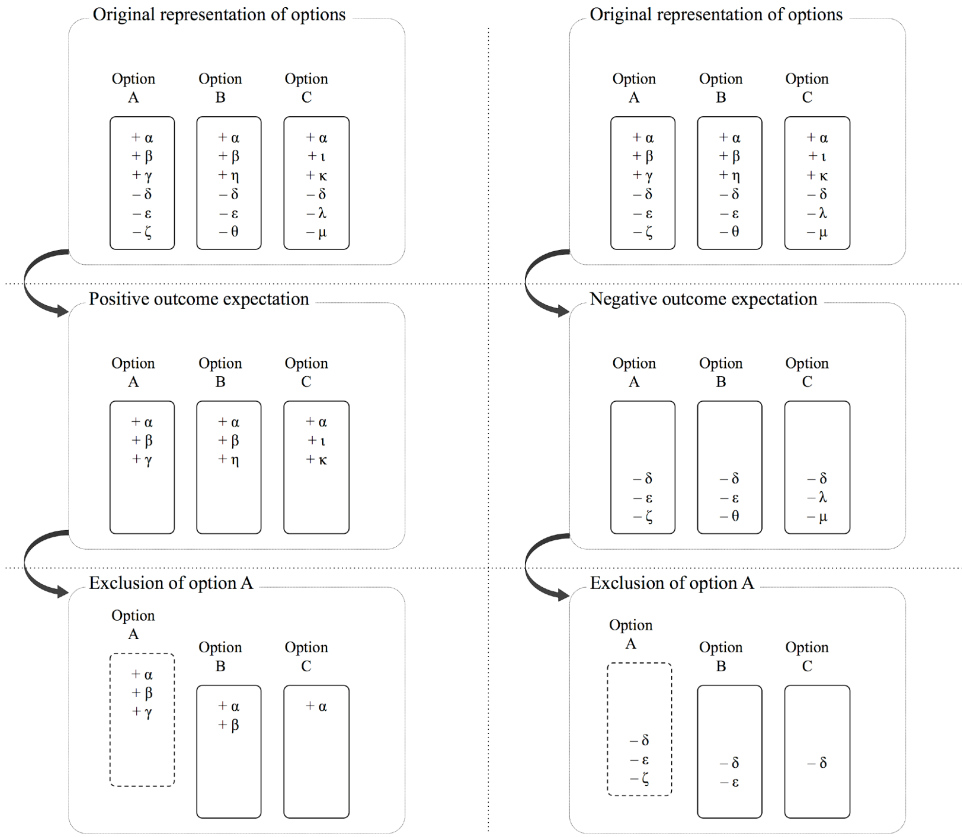

Figure 2. Illustration of the impact of outcome expectation (middle row) and exclusion of an option (bottom row) on the representation of options (top row). Small Greek letters symbolize features of options (+ positive, - negative). Left column shows consequences for positive outcome expectations, right column for negative outcome expectations.

This has important consequences for the subsequent comparison process. When the positive features of the excluded option are more salient, the evaluation of the remaining options should be dominated by the advantages of the excluded option. In consequence, the remaining options should decrease in attractiveness. The left panel of Figure2 illustrates this process: Three choice alternatives are characterized by a number of positive (small Greek letter with a plus sign) or negative features (small Greek letter with a minus sign). When the general outcome expectation for the decision is positive (i.e., choice between attractive

alternatives), people should represent the options primarily in terms of their positive features (second row in Fig. 2). The exclusion of option A should lead to a representation of the remaining options primarily in comparison to option A (third row in Fig. 2). This process has two consequences: First, the remaining options should appear less attractive after the exclusion than they did before because their representation is now comprised of fewer positive features. Second, due to the modified representation, option B should be chosen because, in light of the excluded option A, it has more positive features than option C does.

The opposite should occur when an option from a set of negative options is excluded (see right panel of Fig. 2): The exclusion of an option from a set of options primarily represented by negative features should result in the remaining options appearing more attractive because the excluded option held unique negative features that are not matched by the remaining options. Thus, a more positive representation of the remaining options should result. In this case, option C should profit more from the exclusion of option A and be chosen.

Consider the choice between three beverages. The choice set might include a soft drink known for being tasty (A), a fruit juice that is healthy (B), or a mineral water that is especially refreshing (C). If the fruit juice is excluded from the choice set, the remaining options should be considered with respect to the extent that they are healthy beverages. Assuming that the mineral water scores higher on this dimension, our model would predict a preference for this option as a consequence of the restriction (C > A). In case of the exclusion

of the soft drink (A), the tastiness dimension should be accentuated, yielding a preference for the fruit juice given that it is considered tastier than the mineral water (B > C). If the mineral water (C) is excluded, then how refreshing a drink is should dominate the comparison, making the soft drink more attractive than the fruit juice (A > B). Our model, then, predicts a violation of transitivity as the rank ordering for the remaining options is predicted to vary due to the exclusion of one of the choice options (cf., Rieskamp, Busemeyer, & Mellers, 2006; P. Slovic & Lichtenstein, 1983) .

Under specific conditions, our model also predicts preference reversals. As an example, consider the following choice among four CD players (A, B, C, D) that differ on the two attribute dimensions price and quality. Whereas A and B are superior in quality, C and D are less expensive. According to the proposed model, an exclusion of option A should increase the likelihood of choosing option B, whereas an exclusion of option D should increase the likelihood of choosing option C. Such predictions are in line with empirical results found in research on out-of-stock options ('phantom decoys'; e.g., Doyle, O'Connor, Reynolds, & Bottomley, 1999; Highhouse, 1996; Pettibone & Wedell, 2007). To summarize, the proposed model not only predicts an influence on the evaluation of the remaining options, but also on the subsequent choice between the remaining options. Building on the reasoning of the referent model (Ortony, 1979) and the structural alignment model (Gentner & Markman, 1994), the proposed model claims that the salient features in the excluded option accentuate properties of the remaining options.

Conclusion

The aim of this paper was to apply asymmetric comparison models that were developed in similarity research to the domain of choice. Our central theoretical claim was that whenever choice sets are characterized by a homogenous subset and a single discriminatively prominent option, asymmetric comparisons should result. In these comparisons, the salient features of the prominent option set the featural focus for the

comparison process and hence the evaluative process. For instance, when one of the options in the set of alternatives is excluded during the decision process, it should serve as the standard against which the remaining options are evaluated. Interestingly, this could lead to a reversal in the valence of the remaining options. The predictions derived from this model still await empirical testing.

Coming back to our initial example of purchasing a CD player, our analysis would suggest that, if of the models is no longer available, its features would likely dominate your evaluation of alternative models. So, even if an alternative model outperformed the unavailable one with respect to other features or performed almost as well on the highlighted featureat a lower price, you might still end up waiting for the return of the unavailable model in order to purchase it – even though it may not be the one that best fits your needs.

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Part II

Keeping in Mind What You Cannot Have: Cognitive Perseverance of Lost Options

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Abstract

Various lines of research in decision-making show that irrelevant past events exert a pervasive influence on current decisions. The mechanisms of this influence remain often unclear. In this paper we make the case that, in choices, the exclusion of one out of a set of options enhances the cognitive accessibility of the excluded option. Two experiments employing an incidental memory paradigm demonstrate, that people recall more attributes of an excluded option than attributes of options they can still choose. We argue that basic cognitive principles account for this effect and discuss its impact on subsequent decisions.

Keywords: restriction of choice, lost options, decision-making

Introduction

Entirely rational beings would stop thinking about options that are not available to them. It is often argued that a strictly rational decision maker only considers the future consequences of her decisions and ignores past events such as missed opportunities, as long as they are irrelevant for the consequences of the present decision. In sharp contrast to this normative view, however, the past often exerts a pervasive influence on decision-making. This might be adaptive as people can profit from past experiences to forecast consequences of a present decision. The personal past serves to enhance the accuracy of estimates of the affective consequences and the probabilities of these consequences. For example, in order to decide what to eat in a restaurant, we will use our past general experiences with the food offered on the menu to determine what to order. If available, we will base our decision on experience with the specific dish in this specific restaurant to enhance the accuracy of our prediction even more. However, influences of past experiences might not always be adaptive. Information we gathered in the past might be outdated and not longer accurate. For example, circumstances might have changes as is the case when the set of options has changed.

In this paper we will take a closer look at how the past intrudes on decisions in the case of lost options. We propose a cognitive account of how excluded options effect subsequent decision-making (Ritter & Freund, in press). More specifically, in the current set of studies we investigate the hypothesis that the exclusion of an option enhances its cognitive accessibility. Several lines of research imply that a past event, which, taking a rational perspective, should be irrelevant for the decision amongst the remaining options, exerts a pervasive influence on judgments and decisions. An underlying but as of yet untested assumption is that the past event remains cognitively activated. We will present two experiments testing the cognitive perseverance of lost options and discuss its impact on subsequent decisions.

Maladaptive Influence of the Past

Despite the adaptiveness of considering past experiences for present decisions, research in judgment and decision-making has also shown that influence of the past can yield sub-optimal decisions. A famous example is known as the *gamblers' fallacy* (cf., Kahneman & Tversky, 1972), in which people are generally susceptible to believe that after a line of red numbers at a roulette table, next there *just has to come a black number*. The probability, however, always stays at below 50 percent. Another example is the *hindsight bias* (e.g., Fischhoff, 1975). Imagine the question how likely it was three months before the elections that Barack Obama would become the next president of the United States. Most people will find it very hard to ignore their knowledge about the factual result and hence overestimate the likelihood when compared to forecasts of the election results.

Many real-life decisions are not one-shot games in which we make a decision, experience its outcome, and move on to the next unrelated decision, but entail longer commitment and repetitive decisions or (re-) affirmations. For instance, the achievement of long-term goals such as career or family-related goals requires tenacity and perseverance. That is, for many decisions there are subsequent follow-up decisions whether we want to either stick to a former decision, continue with a current course of action, and invest more in an ongoing project, or reallocate our resources. Such deliberations may become especially critical in the event of obstacles and setbacks, or when resources are diminishing. A paradigmatic case is sunk cost effect that shows that future investment of resources depends on past resource investments even though past investments are irrelevant to the likelihood of success (e.g., Arkes & Ayton, 1999; Arkes & Blumer, 1985; Linder, 1986).

In these examples, the pervasive influence of the past on human judgment and decision-making collides with normative conceptions of the rational perspective. Despite the general functionality of the granted impact of past experiences and actions on present

judgments and decisions, there are evident occasions, where the ability to block such an impact would be desirable. Especially when people experience the presence of past opportunities as aversive. If people missed out on opportunities they once had, they might feel regret for not having made up their mind in time.

The Case of a Lost Option

Oftentimes, people find it difficult to make a decision and are prone to defer their decision (C. J. Anderson, 2003; Dhar, 1997b). By deferring decisions, options of the initial choice set might no longer be available. A normative, rational perspective might claim that a lost option should have no impact on the current choice and on the choice satisfaction because the excluded option is no longer relevant. This position might not hold descriptively, however, as, similar to the previous examples, the impact of past experience is pervasive for current judgments and decisions.

In the case of an excluded option, early studies on reactance theory (Brehm, 1966, 1989) demonstrated that people's choice exhibits systematic influences after the exclusion of an option. In a classical study (Brehm, 1966) participants' positive evaluation of an option increased significantly after it was excluded from the choice set. The theoretical perspective of reactance theory interprets the increase in attractiveness of an excluded option from a choice set in motivational terms. It assumes a primordial motive to be free in one's choices. The restriction of the choice set threatens this freedom and induces an aversive emotional state (reactance). This emotional state motivates people to act in a way to reestablish their freedom. The increased subjective attractiveness of the excluded option is assumed to indicate the protest of people against the restriction to their freedom to choose. Reactance theory has stipulated numerous studies that show, that the loss of an option affects the evaluation of the excluded option (Miron & Brehm, 2006). Moreover, the restriction also affects the evaluation of the remaining options and the preference in the end. If there is no

possibility to restore the initial choice set and make the lost option available again, people tend to symbolically restore their freedom by choosing an option that is most similar to the lost option. In terms of reactance theory, the choice of an option that is most similar to the excluded option constitutes a form of symbolically restoring one's freedom.

Recently we proposed a model that focuses on the cognitive consequences of the exclusion of an option from a choice set (Ritter & Freund, 2009a).The focus on the cognitive processes leaves room for differential consequences as compared to the motivational perspective in reactance theory. Reactance theory allows only one direction of predictions: motive-congruent events (here: no restriction of choice) lead to positive consequences (here: positive affect, positive evaluation of available options) and motive-incongruent events (here: experience of restriction) lead to negative consequences (here: negative affect, striving for the unavailable option). We adopt an affective neutral cognitive perspective in order to examine the processes by which the exclusion affects the decision. The tenet of the cognitive perspective claims that the consequences of a restriction crucially depend on information processes that are stipulated by the event. That is, consequences depend on which information is processed and how this information is processed following the restriction. Although we acknowledge the relevance of motivational states in the context of choice restriction, the informational perspective offers a more flexible tool of analysis.

As a starting point in this model, we claim that the exclusion leads to a higher accessibility of the excluded option as compared to the remaining options. From a rational perspective, one could argue that the representation of a lost option should be discarded, as it is irrelevant for the decision. An adaptive mechanism would therefore inhibit the accessibility of the lost option's representation in order to impede potential impact on the decision process. In contrast, we argue that the exclusion of an option actually fosters its accessibility. We argue that the exclusion yields a figure-ground asymmetry with the excluded option as the

figure standing out from the ground of the remaining options. In such a constellation, the figure is more salient than the background and higher in accessibility.

First, accessibility is a function of the prominence or comparative distinctiveness of an object among other objects or a feature of an object among other features (Higgins, 1996, 2000). The more an object is distinct from other objects in a set, the more it stands out as figural to the background of the other objects (Koffka, 1935). The exclusion of an option adds an informational tag to the excluded option rendering the excluded option distinct from the remaining options. The distinctness from the other options enhances its accessibility. This rationale applies especially for situations, in which the loss of the option occurs as a result of choice deferral due to the absence of a clear preference: under such conditions, it can be assumed that the options in the choice set form a homogenous compound on the overall attractiveness level despite potential differences on the feature level. The exclusion enhances the distinctiveness of the excluded option and should therefore foster its prominence and accessibility.

Second, whereas the remaining options stay unchanged, the representation of the excluded option is changed by the exclusion as the information about the unavailability is added. The alteration of the excluded option brings about differences in the novelty of the representations of the excluded option as compared to the remaining options. Differences on the novelty dimension are equally associated with differences in salience of objects (Wang, Cavanagh, & Green, 1994). Whereas novel objects pop out from an array of objects, familiar objects sink in (Johnston, Hawley, Plewe, Elliott, & DeWitt, 1990; Johnston & Schwarting, 1997). That is, the representation of the excluded option stands out from the set of the representations of the remaining options due to its alteration or relative novelty.

A third principle, associated with salience effects is valence (Shen & Reingold, 2001). In the context of choice, unavailability as opposed to availability represents negative

information. Differences in valence are also associated with differences in salience. Negative information shows a similar pop out effect like new information (Peeters, 1983; Pratto & John, 1991; Wentura & Rothermund, 2003). Accordingly, the negativity of the unavailability is likely to increase the salience of the lost option, making it more accessible.

The three principles of comparative distinctness, familiarity, and valence work in favor of the figurality of the representation of the lost option. In consequence, accessibility of the representation of the lost option should be higher as compared to the remaining options. On this basis, we propose the following hypotheses: The exclusion of an option from a choice set leads to higher accessibility of this option.

It is important to note, that the described salience processes are likely to occur only before people made their decision and under conditions of weak initial preferences towards the options. After a, even preliminary, decision is made, the choice is generally bolstered by affirmative information processing ("spreading of alternatives"; Mann & Taylor, 1970; Tyszka, 1998). In the same vein, pronounced preferences distort the information processing for the benefits of the favored option (Kunda, 1990; Mills, 1999; Russo, Medvec, & Meloy, 1996), and would therefore superimpose the hypothesized process.

Overview over the experiments

Two experiments used an incidental memory task to assess the accessibility of options after the exclusion of one of the options from a choice set. In Experiment 1, participants were asked to imagine a choice between cars. In Experiment 2, participants faced an actual choice between cups. For both choice sets, we generated a list of five attributes to describe each option.

Experiment 1

Method

Participants. Participants (*N*=110; 68% female; *M*age = 28 years; 76% students) were recruited via the participants pool of our lab and via flyers in the university.

Materials. In order to find attributes for the three cars, we conducted a web research on car advertisements, extracting a pool of forty German adjectives used to describe cars. Out of these forty adjectives, we formed three groups of five adjectives each. Groups were matched with regard to word length and frequency.[1] The adjective lists were added to downsized black and white picture of a small car, entitled with an imaginary car name ("Keto", "Daro","Nilo"). Pictures of the cars were blurred as to not give any apparent visual information about the actual car. All three cars were presented simultaneously. Three sets of presentation were used to control for order of presentation. As these three set did not differ from each other, they were combined into one analysis.

Procedure. Participation was reimbursed with 10 Swiss francs (ca. $10 at that time). The experiment was conducted in group sessions in computer-equipped cubicles with a maximum of four participants at a time. The total duration of the experiment was about twenty minutes.

Upon arriving in the laboratory, participants signed an informed consent form. Then the computer-run experiment started. As experimental software, we used MediaLab (Jarvis, 2006).

On the introductory slide, participants were informed that the study investigated effects of product descriptions on preference. They would therefore be presented with a choice of three options, each described by a list of attributes. Participants were told to focus on the descriptions and read them thoroughly, but not yet make their decision, as they would

[1] We used the frequency service tool of the vocabulary web site of the University of Leipzig, Germany, to assess frequency of words (http://wortschatz.uni-leipzig.de).

receive more information in the course of the experiment. These instructions were followed by the presentation of one slide presenting the three cars with pictures and descriptive adjectives for each of them. This slide stayed on the screen for ninety seconds. Afterwards, the slide changed and participants were informed that in their case, one of the options had to be excluded from the choice set. The exact wording of this message read: "Please note: The car DARO was excluded from the selection. In the following you will only be able to choose between NILO and KETO." Controlling for possible effects of excluding one of the specific cars, there were three conditions that excluded one of the cars. Again, no differences between these three conditions were found, so we will report the combined analyses.

The message of the exclusion of one of the options was displayed for fifteen seconds, followed by a filler task of ninety seconds (a random selection of difficult trials of a vocabulary test, Spot-a-word, Lehrl, 1977). After this interval, participants were asked to recall any of the adjectives of the initial presentation of the options in no particular order. This incidental memory task was followed by a slide on which participants made their choice between the remaining cars. Then, participants were asked to answer a number of questions on participants' attitudes towards cars and the decision process if they were actually planning to purchase a car. These questions were administered to control for interindividual differences in involvement with the specific choice set. Apart from these car related questions, participants filled out several questionnaires not pertaining to the present paper. As a measure of memory closely related to the implicit memory task, we administered an explicit general memory task, in which participants were required to memorize twenty words that appeared sequentially on the screen and recall them after a short time interval filled with a calculation task.

After the experiment, participants were thanked, paid, and debriefed. For a subgroup of the participants a funneled debriefing was realized with first asking the participants for any

suspicions about the purpose of the experiment in general, and afterwards asking what they thought about the exclusion of one option. None of the participants articulated any suspicion concerning the exclusion.

Results

We calculated for each participant an index for the relative memory advantage for attributes of the excluded option over attributes of the remaining options by subtracting the mean of recalled attributes of the two remaining options from the number of recalled attributes of the excluded option. Positive values on this index represent a memory advantage for the excluded option, negative values mean that that more attributes of the remaining options were recalled. Five participants failed to recall any adjective, and indicated that they did not read the descriptions thoroughly. They were therefore excluded from further analysis.

As expected, we found a recall advantage for the attributes of the excluded option over the attributes of the remaining options (*M=0.15, CI*=0.02-0.28, *d*= 0.22).[2] On the level of single attributes, the mean difference of recall probability for excluded versus remaining options was positive (*M* = 4.29%; *CI* = 2.07 % - 6.58 %; *d* = 0.47). Two thirds of the attributes (10 of 15) were more likely to be recalled when the option they described was excluded as to when the option remained. None of the control variables - personal involvement with cars and attitudes towards buying a car, car ownership, or any of the other questions - were related to the dependent variable (*r*s = -.13 – .00, all *CI*s included 0).

Taken together, Study 1 showed a memory advantage for attributes of the excluded option over the attributes of the remaining options on the level of means, individuals, as well as attributes. When thinking about the initial set of alternatives, participants recalled more attributes from the excluded option. Interest in cars and personal involvement with the choice was unrelated to this memory advantage.

[2] We report 20%-trimmed means (Wilcox, 2001) and the corresponding 90% confidence intervals (percentile bootstraping method; Wilcox & Keselman, 2003). A 90% CI was selected because of the directed hypothesis.

Experiment 2

The aim of the second experiment was to replicate Experiment 1 with several refinements: First, Experiment 1 presented a hypothetical choice. In Experiment 2, participants had to make an actual choice between three cups that they received at the end of the experiment as part of the compensation. Second, in Experiment 1, the equal attractiveness of the options was established through pilot testing using the mean attractiveness rating as a criterion. Although we designed the options to have equal overall attractiveness at a group level, we could not control individual spontaneous preferences. For that reason, we included individual ratings of the options in the second study. Third, although Experiment 1 showed a recall advantage for attributes of the excluded option, this effect could still be triggered through an affective-motivational process, as proposed by reactance theory. People might keep the excluded option in mind as it stands for threat to their freedom. To rule out this alternative explanation, we included affective measures before and after the exclusion.

Method

Participants. Participants (N = 116; 70% female; M*age* = 25 yrs) were students of the University of Zurich, who were recruited on campus and volunteered to participate in exchange for 5 Swiss francs (equal of 5 US$ at that time) and a mug that they could choose in the course of the experiment.

Materials. A web search on mug advertisements served as the source for adjectives. From the derived pool of forty adjectives, we compiled three groups of five adjectives each for the description of the three different options. Groups of attributes were matched with regard to word length and frequency. We complemented each description with a blurry black and white picture of a mug and a name for the mug (“Oslo”, “Sofia”, “Riga”).

Procedure. Participants were told, that in the course of the experiment, they would have a choice between three mugs and that at the end of the experiment, they would receive

their choice as a gift. They were also instructed to base their choices on descriptions of the options, as the pictures were only schematic. After these instructions, participants filled out a short version of the Multidimensional Mood State Questionnaire (Steyer, Schwenkmezger, Notz, & Eid, 1997) and then evaluated each option separately. For these evaluations, each option was presented in the middle of the screen and participants could use a slider displayed on the right to indicate their evaluation on a range anchored between 0 and 100. A conjoint presentation of the three options followed the individual ratings and stayed on the screen for thirty seconds. Orders of the individual rating and placement order on the conjoint presentation was varied in three different ways across participants. The order of adjectives in each description was randomly determined for each participant. After the conjoint presentation, a message appeared on the screen, indicating that the attractiveness ratings were transmitted into the study database. This transmission stopped after twenty seconds, and a new message appeared on the screen, informing the participant about the exclusion of one of the options. The message read as follows: "The cup RIGA had to be excluded from the choice. This means that you will be able to choose between the cup OSLO and the cup SOFIA." Again, the option excluded varied across participants. The message remained on the screen for 16 seconds, followed by the incidental memory task, in which participants were asked to recall the attributes of the initial presentation in any order. They then filled out a parallel version of the MMSQ. After a series of additional questionnaires that are not relevant in the present context, participants were asked to indicate which mug they would choose and did the same free recall task as in Study 1. After completion of the experiment, participants were thanked, debriefed, paid and received the mug.

Results

One participant recalled all the attributes of the options by using a mnemotechnique and was excluded from the analysis. For the rest of the participants, we calculated the same

index for recall advantage as in Study 1 by subtracting the mean of recall attributes for the remaining options from the number of recalled attributes of the excluded option. Neither this index, nor the number of recalled attributes of each option or the total of recalled attributes was affected by the order of presentation, so this factor was dropped from further analysis.

As argued above, the effect of the exclusion of an option could be distorted by pronounced differences in the evaluations of the options. Therefore, we calculated the SD of the individual attractiveness ratings of the options as a measure for a pronounced preference and excluded all participants that scored higher than the 1 SD above the mean. This resulted in an effective sample of $N = 99$.

The main prediction – a memory advantage for the excluded option - was again supported. Across participants, the memory index was again positive ($M = 0.18$; $CI = .03 – .34$, $d = 0.14$), indicating that participants were recalled more attributes of the excluded than of the remaining options. This held true also on the single attribute level with a mean difference in recall probability of 4.06 % ($CI = 1.96\ \% – 7.66\%$; $d = 0.66$). Ten of the fifteen attributes were more likely to be recalled when the option was excluded as compared to when it remained.

In an additional analysis, we tested the possible effect of mood on this memory effect. The affective state of participants showed a slight decrease from before to after the exclusion ($M = -0.13$; $CI = -0.19 – -0.07$; $d = 0.22$). This decrease, however, proved unrelated to recall advantage effect ($r = -.03$; $CI = -.21 – +.15$), excluding the possibility of affect as a mediator for the effect.

Thus, Experiment 2 replicated the findings of Experiment 1 for an actual choice. Participants recalled more attributes of the option they could no longer choose than attributes of options still available to them, knowing that the would actually receive what they choose.

General Discussion

The aim of this paper was to demonstrate that the exclusion of an option makes it more rather than less cognitively accessible. In two studies employing an incidental memory paradigm, we found that people are more likely to recall attributes of an option that is no longer available to them than attributes of options they can still choose. Free recall is not a pure measure of cognitive accessibility, but rather a compound of several processes (e.g., J. R. Anderson & Bower, 1972). Nevertheless, the incidental memory task combined with free recall seems particularly well suited in the current context because it mirrors the real life situations when, after an option is lost, a person reconsiders her options. If anything, one could argue that we worked against our hypothesis by using this paradigm because other processes than the exclusion of an option might have influenced which of the attributes of the presented options were recalled. One such process is the tendency to form spontaneous preferences when confronted with a choice (Zajonc, 1980). Preferences and preliminary decisions bias the information processing (e.g., Russo, Meloy, & Medvec, 1998; Russo, Meloy, & Wilks, 2000). Attributes of a preferred option are more likely to be recalled (Beckmann & Gollwitzer, 1987). To counteract the development of spontaneous preferences, we designed a choice situation in which people are undecided. We therefore chose attributes that were unlikely to tap into strong pre-experimental attitudes. Moreover, in Study 1 we pretested the options to establish a comparable attractiveness of all three options. Study 2 assessed personal evaluations of the options and excluded participants with strong initial preferences for the same purpose. Let us also add that the exclusion itself could not have influenced the development of an initial preferences because the exclusion occurred only after the options were presented. The current studies cannot address the question if people might try to suppress the excluded option, thereby making it – ironically – more accessible (Wegner, 1994).

The cognitive perspective adopted in this paper adds to several bottom-up perspectives on regret, inaction inertia, and counterfactual thinking (e.g., Byrne, 1997). Other, more top-down oriented perspectives focus on the functionality of pervasive memory influences on decisions, regarding them either as biases, dysfunctional side effects or functional processes (e.g., Epstude & Roese, 2008; Roese & Olson, 1995). In the case of an excluded option, it seems more functional to mentally discard the excluded option, preventing potential regret about the missed opportunity. This would be in line with dissonance theory (Festinger, 1957) which would predict the downgrading of an option that is no longer available. This, however, should only be the case for if the excluded option was the preferred one. Moreover, Festinger (1957, 1964) claimed that dissonance resolution would only take place after a decision was made. Within the dissonance theory framework, however, the predecisional impact of processes preventing dissonance is conversely discussed (Brownstein, 2003). If a dissonance resolution process took place in the current studies, it was dominated by the proposed salience effect.

What are the implications of the cognitive accessibility of a lost option? In a recent model (Ritter & Freund, in press), we argue that a figure-ground asymmetry between the remaining and the excluded option yields asymmetric comparisons with the excluded option as a standard cognitive reference point (Rosch, 1975). More specifically, we claim that the excluded option is cognitively more accessible and hence serves as the standard of comparison for the remaining options. The role of the standard in these comparisons is twofold: Its salient features accentuate dimensions of comparisons (Bowdle & Gentner, 1997) and it provides a point of reference for relative judgments (Tversky & Kahneman, 1974). Based on these assumptions our model makes divergent predictions concerning the evaluative consequences of an exclusion. For salient positive features within the representation of the excluded option, the remaining options should decrease in

attractiveness. This should be the case, when, for example, the positive features posses more discriminative value than the negative features or, when people have positive outcome expectations, i.e., the general valence of the choice set is positive (Dhar & Sherman, 1999; Houston & Roskos-Ewoldsen, 1998; Houston et al., 1991). For salient negative features, on the other hand, attractiveness of the remaining options should increase due to the exclusion. This should occur, when the negative features are more discriminative than the positive features or the general valence of the choice set is negative. Providing evidence for higher cognitive accessibility, then, represents the starting point of this model.

On a practical level, the loss of an option might lead to a subsequent failure to choose other good alternatives (when the remaining option are devaluated, (cf., Arkes, Kung, & Hutzel, 2002; M. Zeelenberg, Nijstad, van Putten, & Van Dijk, 2006) or choice of suboptimal option (in case of increase attractiveness due to the exclusion). Both cases bear the danger of provoking maladaptive decision processes that are not easily prevented.

To conclude: The link between past experience and present decisions goes beyond the use of the experience as an empirical basis to enhance the accuracy of predictions concerning future experiences. In some cases, the past has a pervasive influence despite its irrelevancy for future outcomes. In this paper, we argued that in the case of a lost option, cognitive processes enhance the accessibility of the excluded option, thereby granting it impact on the subsequent judgments and decisions.

Part III:

Consequences of a Restriction of Choice: Shifting Evaluations and Choices

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Abstract

The present research examines the consequences of a restriction of choice. Based on a recent model on the cognitive consequences of an exclusion of one option from a choice set (Ritter & Freund, 2009a), two experiments tested the hypothesis that choice restriction leads to a systematic change in the evaluations of and preference for the remaining options. The model predicts that the shift in the evaluation of the remaining options depends on the valence of the salient features of the excluded option. Supporting this hypothesis, Experiment 1 shows that the exclusion of an option leads to divergent evaluative consequences depending on the valence of the salient features in the choice set. Experiment 2 extends this finding by demonstrating how the exclusion leads to a shift of preference among the remaining options.

Keywords: restriction of choice, lost options, preference

Introduction

Imagine you are sitting in a restaurant and thinking about what to eat. There are three different dishes on the menu that sound very appealing to you and you cannot make up your mind. You then learn from the waiter that one of the dishes is not available today. How will you react when you cannot have what you might have wanted? Will you feel relieved that now you have to decide only between two choices and like the remaining ones even more? Or will you be convinced that the dish that is not available today would have been the best choice now that you cannot have it? In this paper, we take a cognitive perspective on the consequences of the restriction of choice for evaluations and preferences. More precisely, we argue that the exclusion of an option leads to a systematic shift of the evaluations of and the choice between the remaining options.

Considerable work has been dedicated at studying the addition alternatives to a choice set (Heath & Chatterjee, 1995; Huber et al., 1982; Huber & Puto, 1983; Park & Kim, 2005; Ratneshwar et al., 1987; Wedell & Pettibone, 1996). The central finding of this research is that the addition of an alternative can amend the preference between the initial options while the added alternative itself is irrelevant for the decision, i.e., functions as a decoy. The present research somewhat parallels this research by asking the opposite question: What are the consequences of the exclusion of an option from a choice set?

Restriction of Choice

People show a general tendency to try to keep doors open in decisions (Carmon, Wertenbroich, & Zeelenberg, 2003; Shin & Dan, 2004), that is, they put effort into sustaining the availability of options and prevent the loss of options. This tendency is also reflected in the fact that people prefer decisions that can be revised over final ones, even though reversibility diminishes the satisfaction with the outcome of a choice (Gilbert & Ebert, 2002). This effect is at least partly triggered by loss aversion as one loses all options that were not chosen when committing to one of them. Moreover, simply having an option available seems

to evince some feelings of endowment for the options under consideration (Carmon et al., 2003; Shin & Dan, 2004). Reactance theory points in a similar direction (Brehm, 1966). Based on the assumption that people have a motive to choose freely, a restriction – a threat to this motive – constitutes an aversive experience and motivates people to restore their freedom. In consequence, according to reactance theory, the restriction of choice enhances the subjective value of the excluded option, and people strive to either be able to reestablish the availability of the excluded option or choose an option similar to the excluded option (Brehm, Stires, Sensenig, & Shaban, 1966; Min, 2004).

Other research, however, has pointed to more variable consequences of restricted choices. In consumer research, Fitzsimons (2000) has shown that the decision satisfaction decreases when one of the options is no longer available (i.e., stock-outs), especially, when the stock-out option was attractive and was considered for purchase. If rather unattractive options are unavailable, however, decision satisfaction can even increase when the choice set is large. Research on unavailable options in otherwise balanced choices between two options ("phantom decoys") has also revealed the potential of such unavailable options to affect choices (e.g., Highhouse, 1996; Pratkanis & Farquhar, 1992).

Accentuation Model of Option Exclusion

Recently, we proposed a model on the cognitive consequences of a restriction of choice (Ritter & Freund, 2009a, see Figure 3). The Accentuation Model is concerned with how the exclusion of an option affects the evaluation of the remaining options. The Accentuation Model makes two assumptions: First, the exclusion of an option yields an accessibility asymmetry between the excluded and the remaining options with the excluded option standing out. Second, the accessibility asymmetry changes the evaluation of the remaining options such that the remaining options are evaluated against the excluded option. In other words, the excluded option serves as a standard in asymmetric comparisons that

underlie the evaluation process. The salient features within the excluded option set the featural focus in these comparisons.

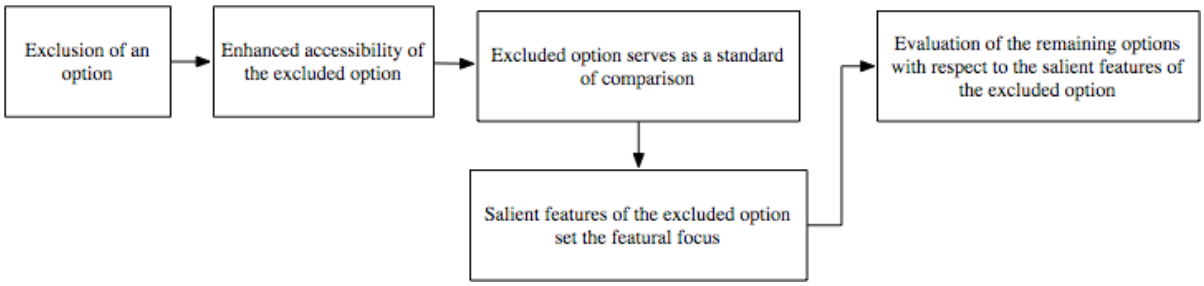

Figure 3. Process Model of the Consequences of a Restriction of Choice (Accentuation Model, after Ritter & Freund, 2009a)

Initial evidence for the first assumption was found in two studies using an incidental memory paradigm (Ritter & Freund, 2009b). For two different choice sets (a choice between cars and cups, respectively), features of the excluded option were recalled with a higher probability than features of the remaining options. The present set of experiments tests the second assumption.

Rationale for the Accentuation Model

From a normative-rational perspective, the excluded option should be irrelevant for the further choice process as it can no longer be chosen; the decision process should therefore be independent of the excluded option. As research on context effects in choices shows, however, irrelevant options often amend the decision process (e.g., Heath & Chatterjee, 1995; Huber et al., 1982). Evaluations and judgments are relative by nature as every evaluation includes some kind of comparison (Mussweiler, 2003). The evaluation depends on the information processed during the comparison. Which information is used, is greatly determined by the standard or reference point. There are several principles that can guide the cognitive system in the standard selection (cf., Mussweiler, 2003a). For instance, more accessible objects are more likely to serve as a standard than less accessible objects (e.g., Herr, 1986). Accessibility of an object can be influenced through priming. As research on the anchoring paradigm has revealed, arbitrary, or even explicitly irrelevant contextual information can turn into a reference point if presented before the judgment (Critcher &

Gilovich, 2008; Tversky & Kahneman, 1974). Cognitive accessibility is also a function of salience (Higgins, 1996, 2000). The salient object among other objects is more likely to be selected as a standard (Tversky, 1977).

Studies on the anchoring effect have shown that judgments are highly susceptible to context information that can be used as a reference point (e.g., Jacowitz & Kahneman, 1995; Strack & Mussweiler, 1997; Tversky & Kahneman, 1974). The impact of this context information is executed by making standard-related knowledge about the judgment target more accessible (G. B. Chapman & Johnson, 1999; Mussweiler, 2001b; Mussweiler & Strack, 1999a, 1999b). The role of the standard of comparison is also highlighted in the research on asymmetric comparison (e.g., Gentner & Bowdle, 1994; Ortony, 1979; Tversky, 1977). Verbal instructions (e.g., "How similar is A to B?") but also object attributes like prominence or structuredness can assign one of the comparison objects the role of the target (position A) or the standard (position B). Switching target and standard typically yields different judgments. The standard seems to serve as the knowledge base that guides which of the dimensions or features of the comparison objects are taken into account for the similarity judgment (Markman & Medin, 1995; Medin, Goldstone, & Gentner, 1993; Ritter & Freund, 2009a).

Building on this literature, we assume that a standard of comparison fulfills a two-fold role: First, the standard enhances the accessibility of the features that are salient within the standard. The salient features of the standard will then be compared to the target. This prediction is based on the assumption that the accessibility of features determines if it is used in the comparison process. Second, standard information is used as a reference point for a relative judgment. This function is inherent to the concept of a standard of comparison as comparisons are necessarily relative to a standard. Even fairly basic judgments such as the severity of pain are subjected to this principle (Kahneman, Fredrickson, Schreiber, & Redelmeier, 1993).

In choices between multiple options, the compound of the choice options functions as an evaluative background for the evaluation of each option. It is an almost trivial observation that the same option can appear very attractive among rather mediocre alternatives but rather mediocre among very attractive alternatives. But even when people have a predefined ideal standard when entering a choice process, the context of the options amends this level (Simon, 1955). Moreover, for reasons of limited processing capacities, not all information about all options will be used as a standard for evaluating each option. People might construe an ideal standard by assembling the most salient positive features of the options or an anti-ideal standard by assembling the most salient negative features of the different options. If one of the options is more prominent, however, we argue that the salient option will take the role of the standard to which the other options will be compared (Ritter & Freund, 2009a).

Predictions

Based on the assumptions of the Accentuation Model, we predict that the exclusion of an option leads to a shift in the perceived attractiveness of the remaining options. The shift in attractiveness should depend on the valence of the salient features of the excluded option. If positive features in the excluded option are salient, the exclusion should accentuate the advantages of the excluded option, thereby decreasing the attractiveness of the remaining options. In contrast, if negative features are more salient within the excluded option, the exclusion accentuates the disadvantages of the excluded option, thereby enhancing the attractiveness of the remaining options. If negative features are highly salient in the excluded option, the option most dissimilar to the excluded option should be preferred. Conversely, if positive features are highly salient in the excluded option, the option that comes closest to the excluded option should be preferred. Our model therefore also predicts a preference shift as a consequence of the exclusion.

Overview of the Experiments

We tested the predictions concerning the shift in evaluation and the impact of the decision in two experiments. Both experiments made use of the fact that in choices, more attentions is paid to unique than to shared features (Houston & Sherman, 1995). Whereas shared features provide no discriminative value, unique features allow differentiating between the options. We therefore created option sets that contained either unique positive and shared negative features or unique negative and shared positive features, respectively, to manipulate the valence of the salient features.

Experiment 1

Experiment 1 aimed at testing the predictions of the Accentuation Model concerning a shift in the evaluation of the options in consequence of the exclusion one option. In Experiment 1, participants had to evaluate and choose between three different word puzzles they subsequently had to solve.

Methods

Participants. A total of 220 participants (58% female, *M*age = 26, 76% students) agreed to volunteer in exchange for performance dependent payment between CHF 10 (ca. US$ 9 at that time) and CHF 25 (ca. US$ 23). Average payment per participant was CHF 13.70 (US$ 12.50). Participants were recruited via flyers in the university and through the participant pool of our laboratory.

Materials. For the three options in the choice set, we formulated six positive features and six negative features (see Table 1). Each of the options was comprised of two positive and two negative features. For the condition “positive salient”, positive features were randomly selected but the negative features were the same for all three options (“is difficult”, “can easily be frustrating”). For the condition “negative salient,” negative features were selected and positive features were set to “is entertaining” and “enhances the vocabulary”.

Table 1. *Positive and Negative Features of the Options in Experiment 1 (German Original Wording in Parentheses)*

	Positive Features	Negative Features
Feature group 1	… is appealing [ist reizvoll]	... is difficult [ist schwierig]
	... is creative [ist kreativ]	... is exhausting [ist anstrengend]
	... is entertaining [ist unterhaltsam]	... is irritating [ist verwirrend]
Feature group 2	... trains logical thinking [trainiert das Denken]	... takes a fairly long time [dauert relativ lang]
	... improves vocabulary [fördert den Wortschatz]	... can easily be frustrating [kann leicht frustrieren]
	... improves memory [schult das Gedächtnis]	... has high time pressure [hat einen hohen Zeitdruck]

Procedure. The experiment was conducted in group sessions with up to four participants at a time. The experiment was run on computers using the software MediaLab (Jarvis, 2006). Participants were randomly assigned to the two experimental conditions. The total duration of the experiment was about 20 to 25 minutes.

After participants signed an informed consent form, the instructions informed them that they would be offered a selection of three different word puzzles they could choose from later in the experiment. Moreover, they learned that before making the choice, they would first be asked to evaluate each of the options. After these instructions, a short demonstration of how the evaluation would take place was displayed: the three options were presented next to each other entitled with the names “Task A”, “Task B”, and “Task C”. The four attributes were presented under the task labels and started with the two positive attributes. Underneath each option a vertical slider was used to evaluate the attractiveness of each option anchored at 0 at the bottom and 100 at the top. After this short demonstration, participants saw one slide with all three choice options presented simultaneous and were asked to rate their attractiveness. Upon completing these ratings the next slide appeared on the screen indicating that the rating would be transferred to a database, which would take some time. After 20

seconds a new slide displayed the message that one of the options had to be removed from the choice set as already enough evaluations for this option had been made and that for the remainder of the experiment only two options would be left to choose from. The exact wording of the message was as follows: "Attention. There are already enough evaluations for Task A. Therefore, Task A will be excluded from your choice set. We will ask you for new evaluations of Task B and Task C. This also means that you will only have the choice between Tasks B and C afterwards." This message remained on the screen for 24 seconds. Participants then rated the remaining two options again and then indicated their choice. Several short questionnaires were then administered for exploratory reasons[3] before participants had the opportunity to solve the task they had chosen, a word puzzle that was in fact identical for all participants regardless of their choice. A 4 x 4 version of boogle (a letter matrix with the task to find as many words as possible) was used as puzzle. After finishing the puzzle, participants were paid according to how many words they found in the puzzle, thanked and debriefed.

Results

As a manipulation check, we compared the attractiveness ratings of the initial presentation between the positive salient and the negative salient condition. Mean attractiveness of the three options scored higher in the positive salient condition than in the negative salient condition ($M = 68.84$ vs. $M = 54.82$; $p < .001$, $d = 2.24$)[4]. As expected, then, participants seemed to focus more on the unique than on the shared features, which supports the effectiveness of our manipulation.

To test our predictions about the consequences of the exclusion of one option, we calculated for the two remaining options the change in attractiveness before and after the exclusion and averaged these change measures. Figure 4 shows the means and the confidence

[3] As none of the questionnaires yielded interesting results pertaining to the hypotheses of this study, they are not reported here.

[4] We used robust statistical methods to analyze the data (20%-trimmed means and percentile bootstrapping, see Wilcox & Keselman, 2003)

intervals of the change scores for the two experimental conditions. Both change scores deviate from 0, indicating an impact of the exclusion on the evaluations. As predicted, the negative salient condition profited more from the exclusion than the positive salient ($p < .05$; $d = 0.4$).

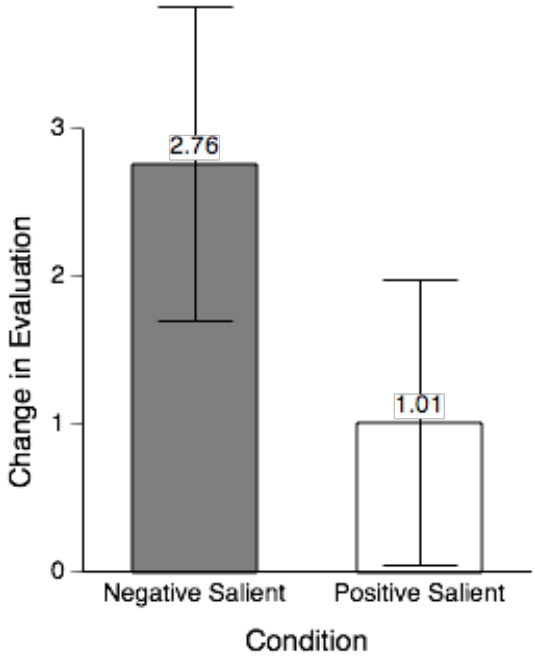

Figure 4. Change in Evaluation for the Conditions Negative Features Salient vs. Positive Features Salient (Error Bars Represent 95% Confidence Intervals).

However, the absolute scores followed only partially our predictions. In both conditions, a positive change score was found, signaling an increase in attractiveness due to the exclusion. This increase was expected for the condition where negative attributes were particularly salient and the comparisons with the specific disadvantages of the excluded option was predicted to enhance the attractiveness of the remaining options. In contrast, for the condition where positive attributes were particularly salient, a negative change score was expected, as the comparison with the specific advantages of the excluded option was predicted to lower the attractiveness of the remaining options. Results confirmed the first prediction only. We will address this issue in the general discussion.

Experiment 2

Experiment 1 provided initial evidence that the exclusion of an option affects the evaluation of the remaining options. In Experiment 1, only general shifts in the evaluation of the remaining options could be predicted but not the final preference between the remaining options because the features of the options did not refer to the same dimensions and were hence not directly comparable. Therefore, the aim of Experiment 2 was to use attributes on shared dimensions in order to be able to test predictions about the preferences for the remaining options. Experiment 2 emulated a website that offers the possibility to rate professors or courses at a university on different dimensions such as content, interestingness, effectiveness, or workload. We set up a vignette internet study in which students were able to read the ratings of three different courses in order to choose their course for the next semester. The prediction was that the exclusion of one of the courses from the choice set determines the preference among the remaining options. If positive features are salient in the excluded course, the course closest to the excluded option on the shared features should be preferred. If negative features are salient in the excluded course, the option most dissimilar to the excluded one should be chosen.

Methods

Participants. Students (N = 351; 43% female; Mage = 22) of the ETH Zurich (Technical University of Zurich) volunteered to participate in this experiment, which was part of a larger study.

Materials. The choice set consisted of three different courses described on three positive and three negative dimensions. The sum of all ratings was equal for all three options. As in Experiment 1, two different conditions were designed with either unique positive and shared negative features (positive salient condition) or unique negative and shared positive features (negative salient condition). As shown in Table 2, positive numbers indicated ratings for positive dimensions and negative numbers indicated ratings for negative dimensions.

Table 2. *Attribute Dimensions and Ratings for Salient Positive Condition and Salient Negative Condition in Experiment 2 (Original German Wording in Parentheses)*

	Salient Positive Features			Salient Negative Features		
	Course A	Course B	Course C	Course A	Course B	Course C
Clarity [Verständlichkeit]	+5	+3	+2	+3	+3	+3
Fun [Spass]	+4	+3	+6	+5	+5	+5
Interest [Interesse]	+2	+5	+3	+3	+3	+3
Work load [Arbeitsaufwand]	-2	-2	-2	-4	-2	-1
Time expenditure [Zeitaufwand]	-4	-4	-4	-3	-2	-5
Teacher-student ratio [Betreuungsverhältnis]	-3	-3	-3	-2	-5	-3

Moreover, each course scored on one dimension a particularly high (low) rating which differed from the other courses by two rating points. This was to highlight the main advantage or disadvantage, respectively, of each course – and thus to increase their salience. According to our hypothesis, these salient features *within* each option should determine the shift of preference due to the exclusion. For example, let us first consider the condition where the positive features were particularly salient in the left column of Table 2: If course A was excluded , the remaining courses should be evaluated especially with respect to “clarity” as “clarity” is the highlighted feature of course A. This accentuated dimension favors course B over course C, thus, fosters preference for course B. If course B was excluded, the “interest” dimension should be accentuated and preference should shift to course C. In the condition where the negative features were particularly salient (right column of Table 2), an exclusion of course A accentuates “work load” and should lead to a preference for course C. An

exclusion of course B should shift preferences towards course A due to an accentuation of "time expenditure". Table 3 lists a summary of the predictions. We administered three different orderings of the courses on the display to control for position effects.

Table 3. *Summary of the Predicted Preference Shifts in Experiment 2*

	Excluded Option	Predicted Preference
Positive Features Salient	A	B > C
	B	C >A
	C	A > B
Negative Features Salient	A	C > B
	B	A > C
	C	B > A

Procedure. Participants were instructed to imagine that they were facing a choice between three university courses for the next semester, which were equivalent in terms of study requirements. To help them in their choice, they were told they would see the ratings of the courses by former students. Ratings of the courses would range form -6 (very bad) to 0 (neutral) for disadvantages and from 0 to +6 (very good) for advantages. Participants were also told that for some of them, the choice set had to be restricted to two options only. They then were randomly assigned to either the full choice set (three options) or the restricted choice set (two options) and to either the salient positive or the salient negative condition. The condition with full-blown choice sets was included as a control condition. In the restricted choice set condition, a frame around two options indicated which options to choose from. Participants were than asked to indicate their choice.

Results

Order of presentation had no influence and we collapsed the data across these conditions in the following analyses. As shown in Table 4, participants preferred in the full-blown choice set both in the salient positive and the salient negative condition the course B. Note, however, that courses were not comparable across conditions as they had different ratings. It seemed that regarding the positive features, students put more weight on "interest" than on "clarity" with the least important feature of a course being "fun". Among the negative features, a bad teacher-students ratio was perceived as more important than "work load" with "time expenditure" being the least important.

Table 4. *Course Preference for the Unrestricted Choice Set in Experiment 2*

	Valence of Salient Features	
	Negative	Positive
Course A	28	23
	(35%)	(29%)
Course B	39	50
	(48%)	(62%)
Course C	14	7
	(17%)	(9%)

For our main analysis, we coded for each condition and each excluded option regarding to whether the preference followed our prediction. Confirming our hypothesis and as shown in Table 5, in all but one conditions the predicted option was more likely to be selected than the alternative option. Overall, in 56% of the cases participants chose the predicted option, which represents a significant deviation from chance ($\chi^2 = 2.8, p < .05$ (one-sided), $w^2 = 0.02$). Participants' preferences were therefore shifted to a small but reliably degree according to our predictions. The close match between the pattern of choices observed

and the pattern of choices predicted by the Accentuation Model indicates that participants put more weight on the dimension highlighted by the excluded option.

Table 5. *Preference for Either the Predicted or the Alternative Option in Experiment 2*

Valence of Salient Features	Excluded Course	Preference		
		Alternative	Predicted	*Total*
Negative	A	17 (53%)	15 (47%)	32
	B	9 (43%)	12 (57%)	21
	C	17 (44%)	22 (56%)	39
	Total	43 (47%)	49 (53%)	92
Positive	A	7 (26%)	20 (74%)	27
	B	18 (47%)	20 (53%)	38
	C	15 (47%)	17 (53%)	32
	Total	40 (41%)	57 (59%)	97

Discussion

In this paper, we argue that the exclusion of an option from a choice set has systematic consequences on the evaluation of the remaining options as well as on the choice between the remaining options. Two experiments supported the main hypotheses derived from the Accentuation Model by Ritter and Freund (2009a).

Experiment 1 showed differential effects of the exclusion of an option depending on the valence of the salient features in the choice set. As hypothesized, the remaining options were enhanced in their attractiveness when one option was excluded from a set of options

with salient negative features. In comparison with the excluded option, the remaining options were not burdened with the same disadvantages, which made them appear more attractive. The model also predicts that, when positive features are particularly salient in the excluded option, the remaining options should decrease in attractiveness. Experiment 1 did not confirm this hypothesis. One reason why this effect was not found might have been the specific advantages used together with the context of the decision. Participants in this study were instructed that they would have a choice between several word puzzles and that they would receive performance-contingent payment. The form of payment was especially emphasized to increase the involvement with the decision of participants. Therefore, the main goal of participants might have been to achieve an optimal performance in the puzzle in order to make as much money as possible. With this goal in mind, the advantages used in the descriptions were rather irrelevant. For example, whether one improves one's memory or is entertained by the task is at least not directly related to one's performance. Due to the lack of relevance of the advantages with respect to the supposed primary goal of increasing payment after the experiment, the advantages might have been perceived as too weak and hence not have exerted a strong influence on the evaluations. The disadvantages, however, were rather significant with respect to the goal to perform as well as possible. Particularly difficulty and time pressure might have been perceived in conflict with the goal to display an optimal performance in order to make more money during the experiment.

Experiment 2 replicated and extended findings of Experiment 1. Using features to describe the options in the choice set that imply a rank order among them, allowed to test the prediction of a systematic shift in the preference. Results confirmed predictions derived from the Accentuation Model (Ritter & Freund, 2009a). After the exclusion of an option with salient negative features, the least similar option was chosen, whereas after the exclusion of an option with salient positive features, the most similar option was preferred.

The effect of the exclusion in Experiment 2 was statistically significant but of rather modest size. Note, however, that the manipulations used in this study were also very subtle. First, the exclusion was not directly experienced but only sketched. Participants were told that they would have either the full choice or a restricted choice, but infact, they did not have all the options first and and then lost one option in the course of the experiment. Second, the salience of features within the options was created by a 2-point scale difference as opposed to a 1-point difference. Future tests of this model will have to show whether stronger manipulations will cause stronger effects.

The Accentuation Model attempts at providing an account of the cognitive processes underlying judgments and preferences. The focus on the cognitive underpinnings offers a flexible and fruitful approach to investigate various effects in judgment and decision making (cf., Mussweiler, 2003a; Tversky, 1977). Especially research on the general benefits and costs of choice would profit from including process models on the cognitive underpinnings of their effects in their research and not rely solely on motivational explanations. As an example, consider the too-much-choice effect (e.g., Sheena S. Iyengar & Lepper, 2000). An extrapolation of the perspective adopted in this paper could be that in extensive as opposed to restricted choice sets, the focus lies more on the negative than on the positive features. If people experience relief when an option is excluded from a large choice set it might be in part because they see the remaining options in a better light. Similarly, the classic reactance effect, that one is upset if one's choice among attractive options is restricted, might also be due to a less favorable perception of the remaining options as a consequence of the restriction. Taken together, we maintain that the Accentuation Model might offer a fruitful perspective on the cognitive processes involved in making judgments and decisions.

The current paper does not provide a full test of the model but adds to the evidence supporting this model (Ritter & Freund, 2009b). In both experiments we manipulated the valence of the salient features directly by making either solely the positive features or solely

the negative features discriminative – a situation hardly to be found in real life. What are the conditions in real life that influence whether one focuses more on the positive or more on the negative features of one's options? The overall outcome expectation – whether one expects to make a choice between generally positive vs. generally negative options – might direct the focus of attention on either the advantages or the disadvantages (cf., Ritter & Freund, 2009a). Future research will need to address this question as well as further implications of these cognitive processes on decision satisfaction and potential regret.

General Discussion

This thesis treated the consequences of a restriction of choice with a focus on the cognitive processes stipulated by the restriction. In the general discussion I will summarize and discuss the findings presented in Part I to Part III and raise some further questions. I will outline several implications of the presented theoretical account on related research topics such as the selection of goals and too-much choice. I will also address interindividual differences that might play a role in this context and present practical implications of this research. Finally, I will provide an outlook as to which future directions this research could take.

Discussion of Findings From Part I to Part III

Taken together, Part I to Part III encompass the presentation of a novel theoretical model on the consequences of a restriction of choice and its embedding within existing accounts on judgments and comparisons (Part I) as well as the empirical testing of its main assumptions (Part II and Part III). To summarize the findings, I will refer to the graphical representation of the model in Figure 5.

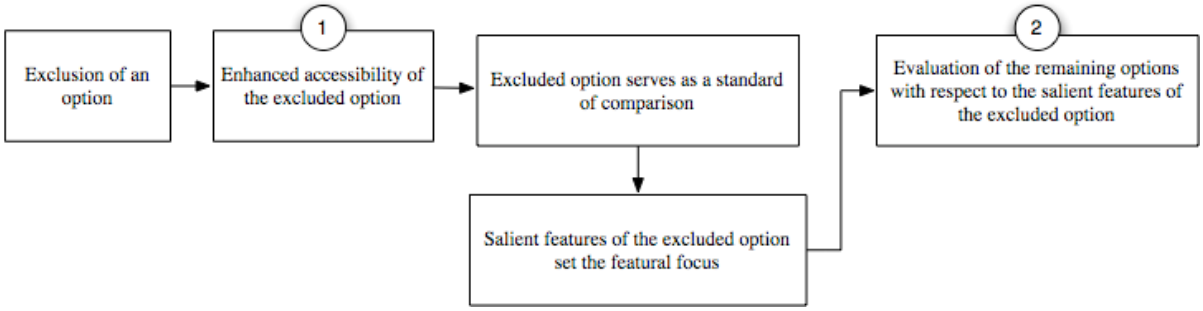

Figure 5. The Accentuation Model on the consequences of a restriction of choice as used in Part III.

(1) We found that the exclusion of an option from a set of options leads to a recall advantage for the features of the excluded option over the features of the remaining options (Part II, Studies 1 and 2).

(2) We found that the exclusion of an option has an impact on the evaluation of the remaining options. More specifically, we found that the exclusion of an option from a set in which the negative features are especially salient increases the perceived attractiveness of the remaining options more than the exclusion of an option from a set in which the positive features are especially salient (Part III, Study 1).

Moreover, we found that choice among the remaining options is shifted due to the salient features of the excluded option. If the especially salient feature in the excluded option was positive, the one option was more likely to be selected that was most *similar* to the excluded option on the dimension of the salient feature. If the especially salient feature in the excluded option was negative the one option was more likely to be selected that was most *dissimilar* to the excluded option on the dimension of the salient feature (Part III, Study 2). In summary, we found that effects of the exclusion on evaluations and choices depend on the salient features of the excluded option.

The following table puts these findings in relation to the hypotheses concerning the consequences of the exclusion of an option as formulated in Part I:

Table 6. *Summary of Hypotheses and Empirical Results of this Thesis*

Hypothesis	Empirical Result
Higher cognitive accessibility of the excluded option as compared to the remaining options	Higher recall probability for features of the excluded option as compared to features of the remaining options
Shifts in the evaluations and choices depending on the salient features of the excluded option	Diverging shifts in evaluations and choices in sets with salient positive features as compared to salient negative features
Increase in attractiveness of remaining options in sets with salient negative features	Higher attractiveness ratings for the remaining options after the exclusion
Decrease in attractiveness of remaining options in sets with salient negative features	Slightly higher attractiveness ratings for the remaining options, but less than in the condition with salient negative features
Choice of most similar option with respect to the salient feature of the excluded option in sets with salient positive features	Higher choice probability for the option favored on the accentuated feature dimension
Choice of most dissimilar option with respect to the salient feature of the excluded option in sets with salient negative features	Higher choice probability for the option favored on the accentuated feature dimension
General outcome expectations determine whether positive or negative features are salient	*Not tested in this thesis*

As the summary of results in Table 6 shows, the reported studies provide good initial support for the assumptions of the Accentuation Model. The Accentuation Model states that the exclusion of an option leads to a re-evaluation of the remaining options in asymmetrical comparisons with the excluded option as a standard. For the excluded option to function as a standard in these re-evaluations, its cognitive accessibility has to be increased as compared to the remaining options. This was confirmed by the two studies in Part I.

If the excluded option has the role of a standard in the evaluations of the remaining options, then the salient features of the excluded option (as the standard) will set the featural focus and reference points for these re-evaluations. This assumption has two implications for the re-evaluations: First, features that are especially salient within the excluded option will *dominate* these evaluations. And second, the features of the remaining options will be perceived *in relation* to the reference points set by the standard. Building on these assumptions, the Accentuation Model predicts divergent consequences of the exclusion for

sets of options with salient positive vs. salient negative features: For salient negative features, the remaining options should increase in attractiveness to the degree that they do not share the same disadvantages with the excluded option. The results of Study 1 in Part III support this prediction. For salient positive features, the remaining options should decrease in attractiveness to the degree that they do not share the same advantages with the excluded option. This prediction was not supported by the study. Instead also an increase in attractiveness after the exclusion was found. This increase was small in contrast to the set with salient negative features but still reliable. As discussed in Part III, this deviating result might have been caused be the specific positive features used in this study in combination with the goals of the participants. However, future research will have to further address this deviating result.

The expected setting of a featural focus by the standard was observed in Study 2 of Part III. As explained above, the featural focus hypothesis states that features that are salient within the standard should receive more weight in the evaluation than others. By making always one dimension especially salient within each option, we could derive specific predictions for the choice among the remaining options depending on which option was excluded. Participants in this study were more likely to choose the option that was favored by the accentuated dimension than the alternative.

On the theoretical level, this means that the central idea of the Accentuation Model, namely, that the excluded option takes the role of a standard in the evaluation of the remaining options, received empirical support from both sides: The results of Part II confirm the antecedents condition for the excluded option to be selected as a standard; and the results of Part III reveal the predicted consequences that could be expected, when the excluded option serves as a standard. However, the evidence provided remains of somewhat indirect nature and it remains an open question, whether the reported pattern of consequences can also be explained by a different theoretical approach.

Critical to the results as whole, are especially two issues: First, antecedence conditions and consequences have not been assessed within the same study. And second, the context parameters that might determine whether the positive vs. the negative features are especially salient in a choice set have not been investigated (see last row in Table 6). I will address both issues in the following section.

Strengths and Limitations

In this thesis, a novel perspective on the consequences of a restriction of choice has been developed and spelled out in a process model. The presented account was able to derive very specific predictions for the consequences of the exclusion of an option. The theoretical approach integrated research on similarity and choice processes and addressed a rather uninvestigated problem of restriction of choice. In a series of studies initial support was found for the basic assumptions and central predictions of this model. Nevertheless, a number of open questions and critical issues remain – both on the theoretical and on the empirical level – some of which I will address in this section.

Theoretical Issues

The Role of Target and Standard in Asymmetrical Comparison. As the literature review in Part I revealed, theoretical assumptions and empirical findings are not homogenous in the field of asymmetric comparison (cf., Aguilar & Medin, 1999). In his seminal contribution, Tversky (Tversky, 1977; Tversky & Gati, 1978) made the case that in target-standard comparisons, "one naturally focuses" on the target (Tversky, 1977, p. 333), giving the features of the target more weight in the judgment. Other authors in succession, however, emphasized the dominant role of the standard for the comparison process (e.g., Bowdle & Gentner, 1997; Medin et al., 1993; Ortony, 1979). The theoretical differences of these accounts have yet not been tested against each other. There is common ground, however, that the comparison outcome depends on the assignment of the elements of comparison to the roles of target and standard.

Some researches have applied Tversky's (1977) model to preferences (e.g., Houston et al., 1989; Sanbonmatsu, Kardes, & Gibson, 1991). In their experiments, Houston and colleagues (Houston et al., 1989) presented a choice of two options to their participants and argued, that the second option would be the target and the first option the standard of comparison. Their rationale stated that due to order of presentation the focus of participants would lie on the option presented last, which would make it the target. The argumentation, thus, is based on a salience asymmetry. This is also the argumentation of this thesis. From this perspective, the work by Houston and colleagues integrates nicely in the presented research and differs only in the labeling of target and standard.

Alignability of Features. An open question concerns the potential role of the alignability of the features that characterize the options. In general, alignable features are values on a common dimension (e.g., the price) whereas non-alignable features are values on a unique dimension, i.e., qualities that are or are not matched by the other options. The structural alignment account stresses the relevance of alignability for comparison processes (Gentner & Markman, 1994) and points to the different processing of features depending on their alignability (see also, Medin et al., 1995). Alignable features are easier to compare and are given more weight in similarity judgments than nonalignable features (Gentner & Markman, 1994; Markman & Gentner, 1996). Research by Johnson suggests that also in choices alignable features are given more weight (Johnson, 1984, 1986, 1989). Slovic and MacPhillamy (1974) presented participants with binary decisions involving both alignable and nonalignable features. Participants weighted the alignable information more, even when explicitly asked to not do so, and even when the nonalignable features were presented in a highly informative way. Furthermore, alignable features are more likely to be recalled than nonalignable features (Markman & Gentner, 1997; Zhang & Markman, 1998). In general then, alignable features seem to be more relevant for the preference construction than nonalignable features. There is some indication, however, that in asymmetric comparisons,

nonalignable features produce stronger effects of direction of comparison (Sanbonmatsu et al., 1991).

The Accentuation Model does not address the issue of alignability, but a few thoughts on the potential role of alignabiltiy for the presented research shall be outlined at this point. Nonalignability can have two causes: either real incomparability or incomplete information. Incomparability refers to the fact that one option posses a feature that the other option cannot posses in principle. This can be the case in choice sets including options from different product categories (generic compositions; Kotler, 1984). For example, when considering which one of two toasters to buy, the number of slots might be a relevant feature to compare. When considering whether to buy a toaster or an iron, the number of slots does not apply as a feature of comparison (cf., Medin et al., 1995). The other reason for nonalignability is the lack of explicit information for a specific feature for one of the options.

In the case of incomparability, nonalignable features are irrelevant and will be left out of the comparison process, or transformed into more abstract features. A toaster with the right number of slots, for example, might be regarded as practical, making practicality a potential feature to compare. In the case of lack of information, the default inference of decision makers is that the option does not possess this specific feature. If one car is described as being very comfortable and the alternative option not, one generally assumes that the alternative is just not comfortable. In the case of incomparability, however, nonaligneable features are likely to be omitted in comparisons and thus without consequences in the context of restriction. For Accentuation Model, this means incomparable nonalignable features will fail to produce effects of the exclusion, whereas in principle comparable nonalignable features will produce even stronger effects because the contrast between target and standard is not only quantitative but categorical.

Familiarity and Availability of Overall Evaluations. Another issue to be addressed is the degree of familiarity with the options and the availability of overall evaluations. Two very

general choice strategies can be distinguished: feature-based or dimensional comparison (dimensional processing) and holistic comparisons ((Bettman, 1979; Johnson, 1984; Russo & Dosher, 1983; Tversky, 1969). Despite the fact that many real life choice sets are organized by alternatives – e.g., products by brands, job candidates by dossiers, etc. (cf., Russo & Dosher, 1983) – people tend to prefer dimensional procession (Russo & Dosher, 1983; Tversky, 1969). The degree to which overall evaluations of the options are available, however, diminishes the engagement in feature-based comparison (Bettman, 1979; Fazio, 1986). In a study by Sanbonmatsu and colleagues (1991; Study 1) participants were either asked to form an overall evaluation of two options or to memorize the features of the options. The subsequent preference rating exhibited a stronger direction of comparison effect for the memory than for the evaluation condition. Participants in the evaluation condition were less likely to be affect by the specific constellation of unique features of the options, indicating that they were less engaged in feature-based comparisons.

The relevance of these findings for the presented research is evident: The availability of overall evaluations might decrease the impact of the salient features of the excluded option. The effect of the exclusion should therefore be modulated by the availability of overall evaluations of the options. Especially when people are highly familiar with the options in a choice set, people might have established attitudes towards the options on which they base their decision. Under such circumstances, the effect of the exclusion might be less determined by the salient features of the excluded option and more by the overall evaluation.

Related to the issue of the availability of overall evaluation is the issue of overall attractiveness of the excluded option. People spontaneously form preferences when confronted with options (e.g., Zajonc, 1980). These spontaneous initial preferences are likely to modulate the consequences of the exclusion. The Accentuation Model was explicitly formulated with the starting situation of equal overall attractiveness among the options in the initial choice set. This assumption bears also external validity as the loss of options might

most often occur due to indecisiveness and choice deferral, that is, in situations where people have no pronounced preferences. Nevertheless, this assumption represents a constraint to this model and limits its applicability. What consequences would pronounced preferences before the exclusion bear? A plausible assumption might be that when the excluded option is rather unattractive relative to the other options, the effect of the exclusion would cease because it would not belong to set of options under consideration – it would simply be irrelevant (cf., Fitzsimons, 2000). If, however, the excluded option is attractive enough to belong to the set of options under consideration, the effect of the exclusion might well be proportional to the degree of preference. The more pronounced the initial preference the smaller the effect of the exclusion. The rationale for this assumption is that pronounced preferences are

On a more general theoretical level, a further specification of the Accentuation Model towards a mathematical model would be favorable to allow more specific testing of the predictions also by means of simulations. The development of such a formal approach is beyond the scope of this discussion, however.

Empirical Issues

Measure of Accessibility. As discussed in Part II, the employed incidental memory paradigm is not a pure measure of cognitive accessibility. As also pointed out in Part II, this fact should work against the effect, thus, making its detection harder. A test of the assumed effect with a more direct measure of accessibility would nevertheless be able to provide further empirical support. For example, the lexical decision paradigm could be employed to assess accessibility. In a potential study, participants could be asked to read descriptions of options that contain highly specific words. After the exclusion of an options, they would perform a lexical decision task with words from all of the descriptions, control words and non-words. Shorter response latencies for words related to the excluded option would indicate their enhanced accessibility.

Duration of the Effect. Another relevant question concerns the duration of the effect. If the exclusion makes the lost option more accessible, this effect might be temporally limited as other, counteracting processes might come into play. People's regrets for past omissions and actions, for example, have been shown to change over time in strength and might ultimately dissolve (e.g., Gilovich & Medvec, 1994; Gilovich, Medvec, & Kahneman, 1998; Kahneman, 1995).

At this point, one could only speculate about specific duration of the effect is pure speculation, as in the two studies only short intervals have been used. Also in other paradigms on pervasive influences of past events on decisions, e.g. sunk costs (Arkes & Blumer, 1985), the duration of the effect remains an open question. Most important for the Accentuation Model, however, is the duration of the effect in relation to the timing of the decision. For long intervals between exclusion and decision, the impact of the exclusion might have ceased. This point will be readdressed in the section on practical implications of this research.

Combined Testing of Accentuation Model. As pointed out in the summary of the findings, an important issue to address would be the combined testing of the assumption tested in Part I and the assumption tested in Part II. In combination these assumptions state that the shift in evaluation and preference caused by the exclusion of an option depends on the increased cognitive accessibility of the excluded option. A straightforward way to test this combined assumption could be implemented by a mediation analysis based on the assessment of both the option accessibility and the shift in evaluation within the same experiment. As a first step in this direction, an incidental memory task was administered for a subgroup of participants in the first experiment in Part II at the end of the session. The data obtained in this first attempt was not conclusive, however, as the recall variable contained too little variance.[5] An improved version of the experiment would have to use a higher number of

[5] The maximum of items to be recalled per option equaled two. A majority of participants failed to recall any features or recalled false features. The incidental memory task was administered after participants completed the boogle riddle, i.e., approximately 20 minutes after the exclusion of an option.

features per option and ask for the recall of attributes at an earlier point during the study. Evidence for a mediation of the consequences of an exclusion by the accessibility of the excluded option would provide strong support for the assumptions of the Accentuation Model.

Contextual Determinants for the Valence of Salient Features. The role of the overall outcome expectations was addressed in Part I. Choice sets can be classified according to their overall valence as generally positive ("Finding the best among good options") or generally negative ("Finding the least worst among bad options"). As stated in the Accentuation Model, this overall valence of the choice set should, other things being equal, determine the focus on the positive or negative features, respectively. People tend to avoid trade-offs between positive and negative features and focus primarily on either of them (Shafir et al., 1993). This focus renders the positive or the negative features salient within each option. In the studies reported in Part III, the salience was manipulated by using either unique positive and shared negative or unique negative and shared positive features. Future studies should address the role of overall expectations by omitting a direct manipulation of the salient features and instead use options sets with clear general valence. For example, choice sets could consist of pleasant vs. unpleasant tasks – for salient positive vs. salient negative features. For optimal comparability, the same dimensions should be used to describe the options in the sets. Another possibility would be to use the same options and manipulate the overall outcome expectations.

Interindividual differences: What Some People Regret, Might Be Relieving to Others

The scope of this research was on general cognitive mechanisms that are involved when choice is restricted. Such general mechanisms leave a considerable amount of variance unexplained that might be traced back to interindividual differences. Interindividual differences are not only of interest in order to reduce unexplained variance and carve out stronger effects, but might also hold information for further specifications of the processes,

thus, help advance the theory. Which kinds of individual differences might play a role in context of restriction of choice? In the following I will discuss two personality variables with theoretical associations with the discussed phenomena: maximizing and optimism/pessimism.

Maximizing

Schwartz (e.g., Schwartz et al., 2002), building on concepts developed by Simon (Simon, 1955), argued that people differ in the dispositional goals they pursue when making a choice. Some people have the goal to find the optimal option, i.e., to *maximize* the possible outcome of their decision. Other people strive to *satisfice*, i.e., find an options that meets their personal criterion. They are looking for a "good-enough option" that is acceptable in their subjective view. Satisficing as a dispositional decision strategy is associated with life-satisfaction, optimism, and self-esteem whereas maximizing is associated with regret and depression (Schwartz et al., 2002). Interestingly, maximizers tend to achieve the objectively better outcomes but experience less satisfaction about these outcomes than satificers (S. S. Iyengar, Wells, & Schwartz, 2006). The "absolute best"is merely an idealization without a real world representation. In other words, maximizers pursue an impossible goal. People striving for the ever-best option continuously optimize their outcome – and thereby outperform satisficers. At the same time they miss their goal of achieving optimal option. Satisficers, on the other hand, are theoretically and practically able to achieve their goal in a choice situation. A realistic aspiration level secures that one finds an acceptable option. Maximizers rely more on external influences and social comparisons for evaluating the options. They also spend more time and effort on comparing the alternatives and are more concerned with options that they fail to pursue (S. S. Iyengar et al., 2006). Inherent to a maximization strategy is the striving for a maximum number of options to choose from – every additional option nourishes the hope of finally encounter the optimal option. Under these considerations, it seems plausible to assume that maximizers would be more affected by a restriction of their choice than satisficers.

We assessed the maximizing tendency of participants in the studies in Part I and Part II using the German version of the maximizing scale (Greifeneder & Betsch, 2006; Schwartz et al., 2002). However, we did not find any reliable associations with the experimental effects. Our original exploratory hypothesis was that maximizers would show better recall for the excluded options and a more pronounced shift in evaluations especially for salient positive choice sets. For maximizers the increase in accessibility should further be fostered by the motivation to have as many options as possible. Furthermore, they should especially be affected by potential advantages they loose due to the restriction.

The lack of associations between maximizing tendencies and the effects of restriction might at least partly be due to scale qualities of the maximizing scale that received serious criticism recently (Diab, Gillespie, & Highhouse, 2008). In fact, the alternative scale proposed by Diab and colleagues (2008) might be of interest for future investigations in the theoretically manifest association.

Optimism and Pessimism

Optimism and pessimism are two other dispositional variables that might be linked to the processes in the Accentuation Model. Optimism and pessimism are stable global expectations concerning the personal future (Scheier & Carver, 1992). Generalized expectations guide the attentional focus in the perception of potential outcomes (Trope & Liberman, 1996). Optimism is related to a focus on the positive sides of an outcome, and pessimism to the negative sides, respectively. We assessed optimism and pessimism in the studies reported in Part II and Part III using the revised Life Orientation Scale (LOT-R; Herzberg, Glaesmer, & Hoyer, 2006; Scheier, Carver, & Bridges, 1994). Our exploratory hypothesis was that optimism and pessimism would interact with the salience of the positive and negative features, respectively. We expected that optimistic persons would be especially responsive to positive features and pessimistic persons to negative features. However, no such relation was found between these dispositional measures and the evaluations of the

options, nor with the effect of the exclusion. Potentially our focus manipulation using the unique-shared paradigm dominated the impact of generalized expectancies. In studies with more ambiguous material, however, dispositional expectancies might still be relevant. In fact, for choice sets that entail perfectly ambiguous options, dispositional optimism and pessimism might even account for divergent consequences of a restriction if the disposition directs the attentional focus on either the positive or the negative features.

Embedding the Accentuation Model in Related Research Areas

In this section the theoretical and empirical account presented in this thesis will be related to neighboring research areas and potential fields of application.

Too-Much Choice

Investigation on choice set sizes has revealed the potential of a proliferation of choice options to negatively affect the decision maker. "Hyperchoice" (Mick, Broniarczyk, & Haidt, 2004) makes the decision process more difficult and leads to less commitment with the chosen option and less motivation to make the best out of one's chosen path (Sheena S. Iyengar & Lepper, 2000). Too much choice can also foster choice deferral (Lancaster, 1990; C. M. White & Hoffrage, 2009). This research manifests a counterpart to economical rationale that more choice optimizes the match between supply and demand, thus, improves the individual satisfaction of needs (Lancaster, 1990). It also opposes the psychological *allure of choice*: people are motivated by having a choice (e.g., Zuckerman et al., 1978), they prefer to choose themselves over letting somebody else choose for them (Botti & Iyengar, 2004) and they also attracted by more choice (Chernev, 2003).

Following the literature on the effects of choice set sizes, it seems plausible that the number of options equally affects the consequences of a restriction. According to the Accentuation Model (Part I), a restriction is assumed to have positive consequences when the general focus is on the negative features, and negative consequences, when the general focus is on the positive features. Applying the Accentuation Model to the effects of choice set sizes

would therefore require a connection between set size and valence of the salient features in the choice set. Let us assume that, in every choice set there is one optimal option. Basic sampling from a set of alternatives with different attractiveness would then predict a higher probability to choose a non-optimal option in larger choice set than in small choice sets. In other words, the base rate for making the wrong choice is higher in large choice sets than in small choice sets. In addition, larger choice sets tend to induce the aspiration of an ideal option (e.g., one option that is better than all the other options in every aspect). The idea of a hypothetical ideal option points to the deficits and shortcomings of every exiting option. Taken together, then, these points seem to imply that larger choice sets emphasize the negative features of the options stronger than do smaller choice sets. From the perspective of the Accentuation Model, then, restrictions in large choice sets should be more likely to lead to a positive shift in the evaluation of the options than restrictions among small choice sets. A similar prediction could be made based on the notion, that in larger choice sets the exclusion of an option reduces the complexity of the decision which acts as a relief on the decision maker. Information overload in decisions (e.g., Jacoby, Speller, & Berning, 1974), however, is experienced primarily due to a large number of attributes per option and not due to an exuberant number of options (Malhotra, 1982). The divergent predictions concerning the consequences of a restriction in large vs. small choice sets is therefore a novel hypothesis that could be tested empirically by excluding options from small vs. large sets that contain options with both positive and negative features. In fact, the rationale sketched above entails also a novel explanation why options in a smaller choice sets can be perceived as more attractive than the same options larger choice set, thus, provides a new perspective on the too-much-choice effect.

Selection of Goals

Research on decision making and choice often concentrates on consumer goods or similar items as objects of investigations. Also the studies in part two in this thesis makes use

of such objects. Nevertheless, not all our choices are concerned with objects in the narrower sense. Throughout the life span we are confronted with numerous choices between options that are more similar to goals than to objects. What instruments do I want to play? Which sport should I practice? Which career should I aspire? In fact, the selection of goals is a central element of successful life-management (Freund & Baltes, 2002). Goals are motivational constructs that direct, organize and energize behavior (Austin & Vancouver, 1996; Fishbach & Ferguson, 2007). Moreover, goals are knowledge structures that entail information about desired end states and potential means to attend them (Kruglanski, 1996). Of interest in this context are especially differences in the mental representations of goals due to motivational orientations. Research on approach and avoidance motivation has revealed that people differ in the way they mentally construal their goals. Avoidance motivated people focus primarily on potential negative consequence they try to circumvent, whereas approach motivated people focus on positive consequences they hope to experience (Nikitin & Freund, in press). Applying the Accentuation Model on these motivational orientations, leads to the interesting prediction that avoidance motivated people should suffer less under the exclusion of a potential goal from their choice set then approach motivated people because of the selective focus on the negative or positive aspects of their goals: For approach motivated people, the positive aspects of the excluded goal should render the remaining opportunities less attractive. For avoidance motivated people, the negative aspects of the excluded goal would enhance the attractiveness of the remaining opportunities.

Life Span: Age Differences in the Reaction to Restrictions

Systematic data on age differences in judgment and decision making is still a rather scarce and mostly limited to single paradigms. However, decisions in real life are made by people of different ages. Failing to take this central context variable into account limits the external validity of many findings especially with regard to the context sensitivity of decisions. Furthermore, the theory on decision making would profit from considering age

differences, as age can be regarded strong independent variable that can help uncover involved processes and mechanisms.

This thesis did not address age differences of the consequences of a restriction. Nevertheless, a short sketch of a possible hypothesis shall be provided at this point. As extensive research has shown, older adults prove to be rather resilient concerning the adversities of aging. Despite of substantial declines in physical condition, health, mental capacities, and social resources, older people show no general decrease of life satisfaction and well-being. Older people are also more capable of dealing with blocked goals and setbacks. With this background, the assumption seems plausible, that older people as opposed to younger people are less likely to experience a restriction of their choice negatively. Different processes might be involved in such a higher tolerance for restriction in older age. From the theoretical perspective of this thesis, one could speculate, that older adults have lower general outcome expectations. When facing a choice, older people might less expect to obtain a great outcome. Moreover, the general motivational orientation changes with age: Whereas younger people are more oriented towards gains and growth, old people try to maintain a certain level of functioning and prevent losses (Ebner, Freund, & Baltes, 2006; Freund & Ebner, 2005). Building on this basic motivational orientation in older adulthood, one could argue that older people should focus more on the negative aspects and possible threats that options might entail when making a decision. Note, however, that this does not imply a general vigilance towards negative stimuli as controversily discussed in the literature on a potential age-graded negativity bias (e.g., Murphy & Isaacowitz, 2008). Older people might only then be oriented towards negative information, when it is relevant for their personal goals. This rationale leads to the prediction that older people should suffer less under restrictions of their choices than younger people. Such a mechanism could add up to other mechanisms that support the successful management of constraints and restricted opportunities in older age (e.g., Ebner et al., 2006).

Practical Implications of This Research

This research aimed at showing and explaining the divergent consequences a restriction of choice might entail. What are the practical implications of this research?

A main message of this research is, that the restriction of choice is not necessarily be experienced negatively. Can this be used by institutions and individual who have to or want to implement restrictions of choices (e.g., policy makers, retailers, etc.)? A very general guideline derived from this research for implementing a restriction is that, previous to the execution of the restriction, the focus should be drawn away from the individual advantages of the different alternatives and directed to their disadvantages. The less attractive the whole choice set is perceived, the less likely the restriction will decrease the attractiveness of the remaining options. In the marketing context, the applicability of this general strategy is obviously limited as one hardly intents to make one's products unattractive. A more subtle strategy for this context would therefore be to take care that the most remarkable features of the to-be-excluded option are matched at least by one other option.

Another practical question concerns the prevention of the influence by an excluded option on one's decisions. From a rational perspective, the impact of the excluded option is undesirable and constitutes a bias in decision making. Also in some real life situations, we might want to prevent such an impact and make a sound decision based only on the currently available options. An intentional effort is unlikely to stop the pervasive influence of the exclusion. In fact, trying to forget about the excluded option might even entail the contra-intended consequence of making it even more accessible (Wegner & Erber, 1992). One potential solution might lie in the limited duration of the effect as mentioned above. If one has enough time for the decision, the best might be to wait until the increased accessibility of the excluded option has "worn off".

The Functional Perspective: What Might These Processes Be for?

This thesis adopted a bottom-up perspective by focusing on the cognitive processes and mechanisms that are entailed by the loss of an option. Questions concerning the adaptivity or functionality of the described processes were not explicitly addressed in this thesis, neither as an explanatory theoretical background nor as a research goal. Nevertheless, following the tenet of William James (1890, p. 333) as well as the modern situated cognition approach (e.g., Schwarz, 2009; Smith & Semin, 2004), "[My] thinking is first and last and always for the sake of [my] doing." Therefore, the question can be asked, what are the implications for the broader perspective of behavior regulation? How does the described cognitive process serve an adaptive reaction to the environment and the attainment of goals?

Recent functional approaches on counterfactual thinking (e.g., Epstude & Roese, 2008; Marcel Zeelenberg & Pieters, 2007) stress the role of these cognitions for behavior regulation. Counterfactuals are thoughts that represent an alternative to past events, thoughts about what might have been (Roese, 1997). Such thoughts can have an affective, motivational and an informational impact. They can inform about what would have to change to achieve a better outcome, they can motivate to put more effort, and they can also make content about the factual course of events.

In a similar vein, it could be argued, the enhanced accessibility of the excluded option servers ultimately a learning and optimizing function to prevent future omissions and mistakes. A pure present/future-oriented perception of choices might not be adaptive with respect to the long-term consequences. However, it must also be considered that the observed impact on evaluations and choices might just represent a dysfunctional side effect or overgeneralization of an otherwise adaptive mechanism.

Future Research

This discussion has raised numerous issues that future research should address – to further the empirical support for the Accentuation Model, but also to extend its application to

related research areas. Concerning the empirical support, I see mainly three different kinds of studies that should be addressed: First, the assessment of cognitive accessibility of the excluded option by a different method, as discussed above; second, a combined study that supports the causal role of the enhanced accessibility for the consequences of the exclusion (via a mediation analysis, as discussed above). And finally, studies that investigate more potential consequences of the restriction. For example, in experimental paradigms where one options is excluded out of set of four options, the exclusion could lead to preference reversals depending on which option is excluded.

Concerning the application of the Accentuation Model to related research areas, I am most interested in investigating the moderating effects of choice set sizes and age-differences as elaborated above.

Conclusion

The bottom line of this thesis states that the loss of a previously available option affects the evaluation of the remaining options and has an impact on the subsequent choice among them. Moreover this impact can be traced back to basic cognitive principles that allow specific predictions concerning evaluations and choices after a restriction.

This research extends previous work on the effects of added options and it provides new perspectives on current questions in the field of judgment and decision making. Hopefully, it can contribute to our understanding of human decisional processes and might ultimately help to support individuals in making sound decisions.

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Appendix

Attributes used to describe cars in Part II, Study 1 :

DARO: exciting [aufregend], spacious [geräumig], down-to-earth [unkkompliziert], original [originell], agile [wendig]

NILO: powerful [krafvoll], innovative [innovativ], comfortable [komfortabel], irresistible [unwiderstehlich], compact [kompakt]

KETO: up-to-date [zeitgemäss], distinctive [unverwechselbar], prestigious [edel], dynamic [dynamisch], high-quality [hochwertig]

Attributes used to describe cars:

OSLO: high-quality [hochwertig], stylish [stilvoll], shapely [formschön], extravagant [extravagant], pithy [prägnant]

SOFIA: perfect in form [formvollendet], exquisit [exquisit], mundane [mondän], tasteful [geschmackvoll], balanced [ausgewogen]

RIGA: sleek [geschmeidig], up-to-date [zeitgemäss], original [originell], spruce [schmuck], top-quality [qualitätsvoll]

Zusammenfassung

Diese Dissertation untersucht die Konsequenzen des Verlusts einer Option bei Entscheidungen. Die zentrale Forschungsfrage dabei lautet: Wie beeinflusst der Ausschluss einer Option die Wahrnehmung der verbleibenden Optionen und die letztendliche Entscheidung für eine dieser verbleibenden Optionen?

Diese Frage wird im Rahmen der vorliegenden Arbeit ausgehend von einer kognitiven Perspektive und einem Fokus auf die informationsverarbeitenden Prozesse, die durch den Ausschluss angestossen werden, untersucht. Dazu wird im ersten Teil der Arbeit ein theoretisches Modell entwickelt, das Prinzipien der kognitiven Psychologie und der Urteilsforschung integriert. Die zentrale Idee dieses Modells besagt, dass die ausgeschlossene Option als Vergleichsstandard zur Bewertung der verbleibenden Optionen herangezogen wird. Im zweiten und dritten Teil der Arbeit werden diese Annahmen im Rahmen von vier experimentellen Studien untersucht.

Die drei zentralen Annahmen und ihre empirische Überprüfung wird im folgenden erläutert:

Anname 1: Der Ausschluss führt dazu, dass die ausgeschlossene Option eine, gegenüber den anderen Optionen erhöhte, kognitive Zugänglichkeit aufweist. Diese Annahme wird insbesondere im zweiten Teil der Arbeit unter Verweis auf grundlegende kognitive Prinzipien begründet.

Unter Verwendung eines *Incidental-Memory* Paradigmas, in dem die Versuchspersonen nach dem Ausschluss einer ursprünglich zur Verfügung stehenden Alternative gebeten wurden, sich an möglichst viele Merkmale aller Optionen zu erinnern, zeigte sich in zwei experimentellen Studien mit unterschiedlichem Stimulusmaterial hypothesenkonform, dass die Merkmale der ausgeschlossenen Optionen mit einer höheren Wahrscheinlichkeit erinnert werden als die der verbleibenden Optionen.

Annahme 2: Die erhöhte kognitive Zugänglichkeit führt dazu, dass die ausgeschlossene Option als Standard in Vergleichprozessen fungiert, die den Bewertungen der verbleibenden Optionen zugrunde liegt. Die Bewertung der verbleibenden Optionen unterscheidet sich vor und nach dem Ausschluss in Abhängigkeit davon, ob bei der ausgeschlossenen Option insbesondere negative oder positive Merkmale salient sind: Bei salienten *negativen* Merkmalen sollten die verbleibenden Optionen nach dem Ausschluss positiver als zuvor wahrgenommen werden, bei salienten *positiven* Merkmalen hingegen negativer.

Diese Effekte wurden in einer Studie, in der die Valenz der salienten Merkmale manipuliert wurde, zumindest teilweise belegt. Entsprechend der Vorhersage unterschied sich die Veränderung der Bewertungen in Abhängigkeit von der Valenz der salienten Merkmale. Allerdings zeigte sich neben dem vorhergesagten Zugewinn an Attraktivität für saliente negative Merkmale auch bei salienten positiven Merkmalen ein minimaler Zugewinn. Mögliche Gründe für diese Abweichung liegen in dem spezifischen Stimulusmaterial.

Annahme 3: In den Vergleichsprozessen bestimmen die salienten Merkmale des Vergleichsstandards, welche Merkmale der verbleibenden Optionen für die Bewertung besonders relevant sind. Gleichzeitig liefern die salienten Merkmale des Vergleichsstandards einen Referenzpunkt zur relativen Bewertung der korrespondierenden Merkmale der verbleibenden Optionen.

In einer Studie mit speziell gestaltetem Stimulusmaterial, in dem stets eine Merkmalsdimension pro Option hervorgehoben wurde, führte der Ausschluss einer Option tatsächlich zu einer systematischen Verschiebung der Präferenz für eine der verbleibenden Optionen.

In der abschliessenden Diskussion wird das theoretische Modell im Hinblick auf die gefundenen Ergebnisse bewertet. Mögliche zukünftige Forschungsansätze zur weiteren Untersuchung der Modellannahmen werden hierbei aufgezeigt. Daneben wird das Modell im

Kontext anderer Forschungsgebiete wie z.B. “Hyper choice“ und die Auswahl von Zielen diskutiert und auf praktische Implikationen der zentralen untersuchten Fragestellung eingegangen.